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EDITORIAL

Books

A MAN who was born and bred in a house in which there were a hundred or more excellent books, who has loved books and read them for half a century, and has read books in several languages and on several topics, such a man must of necessity have very definite views about the qualities of the books that he can read for pleasure. Reading for pleasure is indeed the only sort of reading that is worthy of careful consideration: you may look at an Ordnance map or a diagram of the stars in the northern hemisphere and obtain useful information but this is not an intellectual occupation to be compared with looking at a great work by Botticelli, or Raeburn, or Corot, or Turner. There is no emotion, no stirring of the imagination, no ecstasy to be drawn from a mere diagram. So too it may be profitable, in one sense of the word, to read Bentham's Flora, or Cohen's Organic Chemistry, or Routh's Rigid Dynamics, or Smit's Allotropy, but there is no resultant thrill, no quickening of the pulse, no tendency to tears, nothing similar to the feeling stirred up by the noblest passages of Homer or Virgil, or of the Sentimental Journey, or Esmond. Who has not been touched by the delicacy of the parting of Frank Osbaldistone and Die Vernon on the moor in Scotland at nightfall? No man with any measure of sensibility can read unmoved the story of Nausicaa, or that of Ruth. Text-books and learned treatises are seldom read with unalloyed pleasure; too often there is a proportion of the base metal of profit, or utility, or knowledge: something written to help the reader to acquire facts or to pass an examination. The true writing is when the author feels or believes something and sets it down so that the reader may learn, not a set of facts, but a state of mind and how it came about. The impression on a mind is something true and worthy of respect; the impression of facts on a mere memory may be no more worthy of study than a table of seven figure logarithms. It is not the figures on the printed page that appeal to the imagination and rouse the mind, it is the picture of old Napier, knowing nothing of the theory of indices or the exponential theorem, and yet finding out, after an infinity of laborious calculation, a method of performing troublesome multiplication by most simple addition, one of the most extraordinary advances in the practice of mathematics ever made. The romance, the magnitude, and the truth of the new invention are not to be extracted by any contemplation of 0·3010300 and the following figures. There is a great measure of truth in "the silence that is in the starry sky, the sleep that is among the lonely hills"; those who have walked in their impressionable youth over the Cumberland and Westmoreland and Yorkshire fells, especially at night, will find much in these two lines that cannot be found in books of astronomy or geography. In the preface to one of the best books ever written, Eothen, there is the following passage "I have endeavoured to discard from it all valuable matter derived from the works of others, and it appears to me that my efforts in this direction have been attended with great success. I believe I may truly acknowledge that from all details of geographical discovery or antiquarian research—from all display of 'sound learning and religious knowledge'—from all historical and scientific illustrations—from all useful statistics—from all political disquisitions—and from all good moral reflexions this volume is thoroughly free. My excuse for the book is its truth:" Kinglake was right; in spite of the omission of almost all useful facts, the book is true to life, is a true picture of what a sensitive, observant, and accomplished writer saw, felt, and recorded.

The marvels of the new infra-red photography show us how the isocyanines may enable the photographic plate to portray details that the gentle mist hides from our eyes: the plate gives accurate details but a false picture of what we see. There are few accurate facts in Lamb's Essays; his details are frequently untrue, his dates and initials do not bear investigation; his explanations of the initials are even less accurate than the initials themselves; there are no historical illustrations or useful statistics and yet his acquaintances and his relations—real or imaginary—are living people and they will live as long as David and Jonathan, as the crafty Ulysses, the horse-loving Methley, and the incomparable Die Vernon. Dr. Johnson himself, with his odd tricks and rugged good sense, carefully recorded by Boswell, is not more truly described than Mrs. Battle or Mrs. Field. In literature where does excellence lie, in what does truth consist? Historians tell us that there never was a Hereward the Wake, nor a Robin Hood, that Blondel never sought King Richard the First, and that William Tell is a character of fiction not of history. There is no historical evidence of King Arthur though some careful modern historians believe that he once existed; he too and all the tales about him and his Round Table, belong to the period and the country of Hamlet, and Ogier the Dane, and Valentine and Orson, and Gamelyn, and Ossian, and Ivanhoe; the time is infra-heroic or ultra-historic and the country they belong to is that Hy-Brazil whose capes and islands we see in the distant West when the sunset is unusually propitious and our imagination is particularly vivid. They and all their colleagues and countrymen belong to our dreams and they only come to life, only

attain to truth, when some gifted writer invests them *with a magic garment, that confers upon them the* divine blessing of immortality. Theocritus has so *invested Gorgo and Praxinoe, and Shakespeare* has immortalized Cordelia, and Ianthe will live for ever in the pages of Landor. Mr. Bennett, and Edie Ochiltree, and Mrs. Malaprop, and the Chocolate Cream Soldier, *and Hajji Baba, and Toad-in-the-Hole* with his "non est inventus," these and many others have joined the *immortals.*

The man who has read much and for a long period *of years can feel the thrill of the great authors,* giving their best work for the delight of their readers and themselves; *he can no more err than the* well-trained chemist can err if he recognizes sodium by its spectrum, *or the expert a Henry Clay by its aroma.* Reading for pleasure brings you sometimes, but not always, into *communion with the immortals; you recognize* their presence instinctively as the ancient Greeks in the heroic age recognized the presence of Athene when she came amongst them.

The qualities that *enable an author to attain* occasionally to passages that will live for ever are, first, a clear and accurate mental picture of what he intends to put into words and second, the unerring use of the most apt and appropriate words that will be read with the least effort and the greatest pleasure. Have you ever watched a well-trained artist, not necessarily one of genius, take a large sheet of paper and a box of chalks? How soon he sketches in his mind the subject for his drawing! How surely he indicates the house or the face he is engaged upon with just the lines necessary for his purpose and for his own style! Years of practice enable him to know at once whether he will use one line or three, and how strong each line is to be. If he is lucky in the choice of his subject and exceptionally skilful in his handiwork he may produce a notable picture, but he cannot always attain to his best. So with the author, he may think of a subject that lends itself to a pleasing article and he may handle it with such charm that it will carry him and his readers easily and joyously to the end. Much reading of good literature will prevent him from using the hackneyed phrase, the ugly clause, the harsh expression; constant practice will enable him to use a simple style, or a difficult one, as he pleases. Some authors write in the hope and expectation that the reader will read a sentence twice in order that he may detect all its meaning and beauty; other authors have a less concentrated style and dilute their meaning with a body of simple words. It is impossible to lay down useful rules about style; the abler a man is, the less likely is he to take advice about his writing. Nevertheless many men have given plenty of such advice; Bagehot said that the knack in style is to write like a human being and that authors should be themselves and write their thoughts in their own words, in the simplest words, in the words wherein they were thought. In another passage he says: "The reason why so few good books are written, is that so few people that can write know anything. In general an author has always lived in a room, has read books, has cultivated science, is acquainted with the style and sentiments of the best authors, but he is out of the way of employing his own eyes and ears. He has nothing to hear and nothing to see. His life is a vacuum." *The extent to which these observations* seem to be true partly depends on what we mean by a "*good book.*"

Dipole Moments

Many of us read about dipole moments without knowing exactly what they mean. Perhaps we vaguely know that a polar molecule is one with a positive charge on one part of the molecule and a negative charge on another part, *the molecule as a whole being neutral.* The dipole moment is got by multiplying either charge by the distance between the two charges and it is a very small fraction of an electrostatic unit. If there is no *dipole moment the molecule is non-polar.* The molecules of hydrogen chloride, ammonia, sulphur dioxide, and *nitrobenzene are polar; those of hydrogen, oxygen,* nitrous oxide, and carbon dioxide are non-polar. If *molecules of a polar substance are introduced into an* electric field between two charged plates, each molecule *will produce a field in its immediate neighbourhood* which is opposed to the original field and reduces the *field strength between the plates.* The ratio between the field intensity when there is a vacuum between the plates and the field intensity when there is a substance between the plates is called the dielectric constant of the substance and this can be exactly measured at various temperatures. Such measurements form the basis of the first and most accurate way of determining the dielectric constant. A second way of finding it depends on the measurement of molecular refraction and it is applied to the study of solutions. A third method depends on the examination of a beam of molecules produced in a high vacuum and passed through an electric field. For polar molecules a broadening of the deflexion of the beam enables the dipole moment to be approximately estimated. In all these methods what is measured is the dipole moment of the whole molecule but the various parts of the molecule may have dipole moments and these may counterbalance each other wholly or in part. It is by such considerations that we believe that the atoms of carbon disulphide, carbon dioxide, and nitrous oxide lie on a straight line; on the other hand the molecules of water and sulphur dioxide are such that the atoms do not lie on a straight line. In the case of water its infra-red spectrum suggests that the three atoms are inclined at an angle either of 64° or 110° and the angle is now generally taken as 110°. By similar investigations we conclude that the molecule of ammonia is pyramidal and that carbon tetrachloride has a central atom of carbon with four chlorine atoms arranged tetrahedrally round it. The benzene molecule is a symmetrical self-compensating structure. Quite recently Sutton and others have applied the study of dipole moments to the problems of substitution in the benzene ring and it is hoped that a theoretical basis may be found for the old familiar rules. Other bodies similarly studied are the oximes and azo compounds. Dipole moments have now been measured for a great many compounds of all degrees of complexity. As so often happens, the interpretation of the results has not kept place with their accumulation. It may be confidently anticipated that further progress in this field, correlated with work on molecular spectra, will go far towards producing a clear picture of the structure of molecules.

REVIEWS

MODERN ALCHEMY. By W. A. Noyes and W. A. Noyes, Jnr. Pp. ix + 207. London: Baillière, Tindall & Cox, 1932. $3, or 15s.

This book consists of seven chapters in which modern advances in chemistry, in so far as they depict the unfolding of knowledge sought by the alchemists of old, are reviewed. "For more than a thousand years," say the authors, "alchemists sought in vain for the philosophers' stone, which should transmute base metals into gold, and for an elixir of life, which should give eternal youth. The quest was finally abandoned as hopeless, but the transmutation of elements has been observed in recent times, and many ways of healing disease and prolonging life have been found." The chapters are entitled: The methods of science; atomic structure; the transmutation of the elements; valence; the effect of various radiations on chemical systems; new elements and new uses for old ones; the elixir of life. The last chapter is a sketch of some applications of chemistry to medicine and dietetics. On an end sheet the publisher, whose work has been well done, gives technical particulars describing the presentation of the volume. A. A. E.

INDUSTRIAL CHEMISTRY. By W. T. Read. Pp. vii + 576. New York: J. Wiley & Sons; London: Chapman & Hall, 1933. 31s.

The rapid development of industrial chemistry renders it increasingly difficult for one person alone to deal with it adequately. The author, realizing this, states in his preface that "ninety different individuals have had a part in the revision of the final manuscript."

Nine chapters are devoted to introductory matter such as chemical engineering, economics, and literature; sixteen to a consideration of various groups of chemical industries; and, finally, two chapters to explosives, paints, and varnishes, which assemble information only touched upon in previous chapters. The provision of more cross-references would have added to the book's usefulness, since the system of classification adopted—viz., electro-chemical, carbohydrate, protein, silicate industries, etc.—is conducive to a certain amount of overlapping. Muscle Shoals is discussed under economics, but it does not transpire until 140 pages later that this plant was designed for the cyanamide process.

The American viewpoint is maintained throughout the book, which is intended as a text-book for students and a reference book for business men. Generally speaking, students require to be taught fundamentals, which may be turned to account in whatever industry they may eventually find themselves, whilst chemically-minded business men invariably require more detailed information than could be condensed into this book. The inclusion of references to other books or articles would have increased its value in this respect.

The line drawings as a whole are instructive, but being culled from numerous sources they sometimes contain a superfluity of engineering detail, or they endeavour to illustrate a piece of plant with only one elevation when more are needed.

Sufficient care has not been taken to indicate underlying reasons, why for instance the open hearth is preferable to the simpler Bessemer converter for steel making; why potassium chloride separates in a practically pure condition from a supersaturated solution of borax on cooling a Searles Lake brine; and why castor oil is blended with mineral oil as a lubricant for machinery.

Statements such as: "Prior to the foundation of *Chemical Abstracts*, readers of chemical literature were dependent upon *British Chemical Abstracts*," and "The methods of chemical treatment of water to prevent scale lead to an increase in the total dissolved solids," require modification.

The book omits fermentation industries, essential oils, and food chemistry, but contains a range of up-to-date facts concerning the chief chemical processes in the compass of a handy, single volume. M. B. DONALD

CHEMISCHE TECHNOLOGIE DER LÖSUNGSMITTEL. By Dr. O. Jordan. Pp. xiv + 322. Berlin: J. Springer, 1932. 26.50 rm.

The word solvent has gained a very definite and significant meaning during the last decade: a wide range of organic substances has been pressed into use for a variety of purposes. There is much to know about them collectively and individually and their use in so many different trades makes books dealing with them comprehensively and exclusively a necessity.

Dr. Jordan's work is arranged in sections, set out at length in a contents, there being no index. They deal with the physical and the physiological properties of solvents, with solvents for cellulose derivatives and for resins, with plastics; also with their recovery, their analysis and their preparation. A long list of solvents and plasticizers is described individually, the information being limited to the formula, physical constants, name of a German supplier, chemical properties and uses. Certain tables at the end summarize the physical properties, the solubilities of resin and rubber, and of certain dyes. Like all German publications it is far too expensive.

A useful list of binary and ternary mixtures of minimum boiling point is a novel feature and a final list of the trade names of the solvents will be found of value, though encouragement should not be given to allowing such names to creep into use. They are unscientific and improper. Incidentally, the reviewer notes the omission of the name "drawinol" applied to trichlorethylene when used as dehydrating agent for making absolute alcohol by the azeotropic process. In the book the name "tri" is applied to it, the synonym "drawin" apparently indicating solvent mixtures containing ethyl acetate; the example shows the confusion which is likely to arise from the practice.

An amazing range of substances are now of technical importance as solvents, among which attention may

be drawn to the glycol esters including dioxan, the more complex alcohols such as diacetone alcohol, and the chlorhydrins of glycerin. Furfurol sold in tank wagons is now a commonplace.

The book is very easy to use and full of information: it should prove a definite boon to users, present or potential, of solvents. E. F. A.

I PROGRESSI DELL' INDUSTRIA CHIMICA ITALIANA NEL I° DECENNIO DI REGIME FASCISTA. Raccolta di *Monografie Curata da Domenico Marotta.* Associazione Italiana di Chimica, Roma. Pp. x + 550. Roma: Tipografia Editrice "Italia," 1932.

This work consists of a valuable series of 41 monographs giving a review of the great developments made in chemical industry in Italy during the past ten years. Some of these monographs are very detailed in character—for example that by Dr. G. Ginori Conti on the boracic acid industry, which covers 74 pages and includes 75 photographs. *A special feature of the work is* the very large number of admirable photographs it *contains. Italy entered late into the sphere of chemical* industry and thus had the advantage of being able to *make a start with the latest and most up-to-date* equipment and design. Judging from this report the *result has been altogether surprising and the past ten* years has been a period of great activity and development.

The monographs were prepared by specialists under the auspices of the Associazione Italiana di Chimica to celebrate the Decennium of the Fascist revolution. The Great War found Italy quite unprepared in chemical industry, but as stated in the Introduction, "miracles of daring (audacia) were accomplished by both chemists and industrialists. Laboratories and factories arose as if by magic." Since then the government of "il Duce" has given an enormous impetus to the industrialization of Italy, by creating a chain of scientific and research institutes in close touch with the factories. "Italian men of science are working in close union with our industrialists towards a single end—the economic and industrial independence of the nation." The results of this movement are admirably illustrated in the present volume, which is well worth careful study by our own chemical industrialists, and possibly even by our politicians and economists. W. A. D.

ORGANOMETALLVERBINDUNGEN. PART I. ORGANOMAGNESIUMVERBINDUNGEN. By Dr. F. Runge. Chemie in Einzeldarstellungen. Edited by J. Schmidt. Vol. XVI. Pp. ix + 328. Stuttgart: Wissenschaftliche Verlags., 1932. Paper, 24 rm.; bound, 26 rm.

This volume, which is part I of a series of monographs devoted to organo-metallic compounds, edited by Prof. J. Schmidt, deals with organic derivatives of magnesium. These materials play a very important part in organic synthesis although they have rarely been isolated as separate entities. Their first employment was due to P. Barbier in 1899, who obtained the secondary alcohol, dimethylheptenol, by treating the ketone, methylheptenone, in ethereal solution with methyl iodide in presence of magnesium. In the following year, *Victor Grignard observed that magnesium in the* presence of dry ether reacted with numerous alkyl *bromides and iodides giving rise to mixed organo*-magnesium compounds having the general formula *R.MgX. The chemical constitution of these very* reactive substances is still somewhat in doubt for when prepared in ethereal solution they include one or more molecular proportions of ether. The ether-free individual compounds have, however, been obtained when the reaction between the metal and alkyl halides is catalysed in inert solvents by the addition of a few drops of tertiary amine (Tschelinzeff, 1904).

The supreme importance of Grignard's observation lay in the fact that these organo-magnesium compounds reacted with a great variety of aldehydes, ketones, and derivatives of carboxylic acids to give rise to alcohols. This Grignard synthesis has proved to be one of the most generally applicable operations of organic chemistry. In addition to the synthesis of primary, secondary, and tertiary alcohols the process is available for the production of hydrocarbons of varied types, ethers, phenols, aldehydes, ketones, and carboxylic acids. Grignard reagents undergo noteworthy changes with inorganic and organic nitrogen compounds and they have facilitated very considerably the production *of organo-metallic and -metalloidal derivatives.* The author gives copious references to these reactions in *the twelve chapters of his monograph which contains* subject and name indexes.

The author duly records the extensive contributions of French chemists following on the epoch-making discovery of Grignard, and with one notable exception he does justice to British researches in this field. But in view of the many elegant syntheses in the terpene series accomplished by W. H. Perkin, jun., and his school, it is surprising that there are only two entries to the name of this distinguished investigator (compare J.C.S., 1904, **85**, 660; 1905, **87**, 647, 659, 666, 1075; 1906, **89**, 837, 847; 1907, **91**, 373, 498, 1743, etc.). G. T. M.

ORGANISCHE FARBSTOFFE: ANLEITUNG ZUM SCHRITTWEISEN EINDRINGEN IN DIE FARBENCHEMIE AUF KOORDINATIONSTHEORETISCHER GRUNDLAGE. By Dr. R. Wizinger. Pp. xii + 88 + LXVIII. Berlin and Bonn: Ferd. Dümmlers Verlag., 1933. Paper, 9.80 m.; bound, 11.80 m.

In 1925 W. Dilthey published his first paper on a *theory of the constitution of coloured organic compounds* containing some novel features. The author of this *book, who has worked with Dilthey for many years,* is an ardent advocate of the theory, and the book affords him an opportunity for presenting the range of organic dyestuffs in their new dresses. The subject is, of course, one on which chemists delight to debate, and already a substantial polemical literature has grown up in Germany around this theory which sweeps overboard entirely the conceptions of such students of the subject as Witt, Bayer, and Armstrong. The theory is based on two sets of experimental facts, namely the appearance of colour in complex hydrocarbons containing what we old-fashioned chemists called systems of conjugated double bonds; and the colour of free radicals of the

triphenylmethyl type. The old ideas of chromophores and auxochromes are discarded, and two simple concepts are advanced to account for colour. These are: (1) the only chromophore is a co-ordinatively unsaturated individual atom; (2) when such an atom passes into the ionized state absorption of light is greatly intensified. What exactly constitutes a "co-ordinatively unsaturated atom" is not too clear. It is defined as an atom exerting less than its maximum co-valency; such are the carbon atom carrying a double bond, and the nitrogen atom in azo compounds. The conception is not the same, as might be supposed, as that of an atom with an incomplete electron octet, since it also includes negatively charged carbon having a complete octet, as in the highly coloured $[(NO_2\cdot C_6H_4)_3\dot{C}]$ Na^+ and positively charged carbon with an incomplete octet as in $[(NMe_2\cdot C_6H_4)_3\dot{C}]^+ Cl^-$. It is somewhat remarkable that the author does not discuss the theory in relation to the modern conceptions of valency-electrons which have contributed so much to our understanding of the structure of co-ordination compounds. It will be understood that in this theory, auxochromes play a different part from that which they take in the quinone theory. In the latter theory the auxochrome, in salt-forming dyestuffs, becomes a part, or is potentially a part, of the chromophoric system; in the new theory its function is only to augment the tendency of the chromophoric atom to ionize. Thus in the basic triarylmethane dyes, the basicity is supposed to be concentrated entirely at the central carbon atom. One can find much with which to disagree in the theory, but nevertheless the reviewer has found the book most interesting and stimulating, particularly in the application of the new theory to azo dyes and to different types of halochrome colours where the quinonoid theory breaks down. It is well worth careful reading by all chemists interested in dyestuffs, whether scientifically or technically. An appendix contains an abridged "Colour Index" of 150 dyes representative of all classes, some of which are formulated in accordance with the new theory. E. H. R.

A Short Organic Chemistry. By F. S. Taylor, Ph.D., M.A., B.Sc. Pp. viii + 378. London: W. Heinemann, Ltd., 1933. 5s.

This book, which is a shorter version of the author's "Organic Chemistry," has been designed primarily for the use of first-year students, and therefore the greater part of the work is rightly devoted to aliphatic compounds. At the same time the more elementary portions of the aromatic section of the subject receive adequate treatment, whilst but passing reference is made to heterocyclic substances. Throughout the book there is much evidence of scholarship and of Dr. Taylor's skill as a teacher, the incorporation of recent advances in knowledge being happily combined with clarity and precision of treatment; the manner of exposition and the general design are so pleasing that the interest of the beginner will be captured and retained. Towards this end a copious display of graphic formulæ and charts of reactions of many substances, both aliphatic and aromatic, will prove helpful, these features of the book calling for special commendation. By means of these charts the student will see at a glance something of the implications of organic chemistry, and incidentally will be assisted in forming a mental picture of the stages in numerous syntheses. The publishers have presented a dignified and well-bound book that will withstand the hard wear which it merits. W. H. B.

Chemistry of Organic Compounds: A Year's Course in Organic Chemistry. By J. B. Conant. Pp. x + 623. New York: Macmillan Co., 1933. 20s.

This textbook is described as a year's course in organic chemistry, though more material is included than could normally be covered in a year. Particular care is taken in the early chapters to develop proofs of structural formulæ, and throughout, the theoretical problems in organic chemistry are clearly stated.

The practical as well as the scientific importance of substances is emphasized, and as is proper in an American book, the enormous part the automobile has played in the development of industrial organic chemistry is stressed.

Considerable space is given to the advances which organic chemical methods have contributed to biological problems, and as an introduction to plant and animal biochemistry, proteins, enzymes, carotenoid, anthocyanin and pyrrole pigments, sterols, and the vitamins are briefly discussed. The author believes that the student can derive more satisfaction from current developments than from the study of some important development of the past.

A final chapter is devoted to stereochemical problems, such as the determination of absolute configuration and the Born-Kuhn theory of the physical basis of optical activity.

It is gratifying that an author who has produced so much original experimental work should realize the importance that beginners should approach the subject of organic chemistry properly, and that he has spared the time to produce what seems to the reviewer such a very excellent introductory text book. K. F. A.

Organic Chemistry. By F. S. Taylor, Ph.D., M.A., B.Sc. Pp. xii + 587. London: William Heinemann, Ltd., 1933. 10s. 6d.

Textbooks of organic chemistry must nowadays be some of the many things of which the supply exceeds the demand. It is difficult to see the need for yet another new textbook, more particularly for one which closely resembles all the others. It is written for students working for the same examinations as are the majority of such books and necessarily contains the same facts treated in the same order.

A welcome novelty lies in the treatment of the carbohydrates as cyclic compounds. The majority of elementary textbooks sacrifice truth for simplicity, but the time must come when the modern formulæ are used in textbooks as well as in the more advanced literature. The book on the whole follows the modern tendency towards the biochemical as opposed to the industrial side of the subject, but it loses interest through an almost complete neglect of the history of organic chemistry. There are a few strange omissions in the

treatment of the benzene derivatives. For instance, no mention is made of any method of distinguishing between the disubstituted benzenes, while Thiele's theory of the structure of benzene is omitted on the grounds that it is beyond the scope of the book, which nevertheless introduces the elementary theory of the different forms of valency linkages. It also is slightly more advanced than most organic textbooks, through the introduction of chapters on the terpenes, heterocyclic compounds, alkaloids, and proteins. It is well written in a rather condensed style and amply illustrated with formulæ and diagrams. The general production is excellent. L. M. M.

Essai sur la Chimie Comparée : Les Corps Simples. By Dr. I. N. Longinescu. Pp. vi + 98. Paris : Les Presses Universitaires de France, 1932.

The author of this small treatise is of the opinion that too little attention is paid in the study of inorganic chemistry to the relations among the members of the groups of the periodic system, and attempts to make good the deficiency. In most text-books there are brief introductory sections dealing with such matters before the detailed study of the individual elements in each group is taken up, and the present volume gives what may be regarded as expansions of such sections. There is no doubt that such a treatment offers many advantages to the student and the book is a useful supplement to existing works, but it may also be said that no real knowledge of inorganic chemistry can be obtained by this method alone. In each section the physical properties, allotropic forms, and chemical properties are very briefly considered. The author promises a second volume dealing with binary compounds in which the same method of treatment is to be adopted. The two principal sources used by the author are Ditte's *Etude générale des Sels*, 1906, and Ephraim's *Anorganische Chemie*, 1929, both of which are similarly planned. Prof. Longinescu's essay is one which can be read with profit by students taking courses in inorganic chemistry. J. R. P.

Gmelins Handbuch der Anorganischen Chemie. 8th new revised edition. Edited by the German Chemical Society. System-Number 30. Barium. Pp. xvi + 390. Berlin: Verlag Chemie, 1932. 64 m. Subscription price, 56 m.

The chemistry of barium is carefully and comprehensively considered in this volume, the references to original literature including work published up to April, 1932. Examination of those sections, with the subject matter of which the writer happens to be familiar, has left the impression that the treatment is thoroughly reliable and trustworthy. Normal lines of presentation have been followed : occurrence, separation from natural sources, preparation of the metal and, finally, a description of the compounds of the element is the sequence, the last topic occupying some four-fifths of the book. The occurrence, set out under continents and countries, shows the widespread distribution of barium minerals. The various and not very satisfactory methods of preparing the metal by thermit reductions, thermal dissociations, and electrolysis are given together with its physical properties including atomic, mechanical, spectroscopic, and electrical data. Along with the chemical properties is a list of those reactions of analytical interest. The section on the compounds of barium is excellently done and includes an account of a large number of systems, aqueous and thermal, in which compounds of the element are included. Many of these are illustrated graphically. The volume is undoubtedly a most up-to-date and reliable reference book for all matters appertaining to barium. P. L. Robinson

Gmelins Handbuch der Anorganischen Chemie. 8th ed. Edited by the German Chemical Society. System-Number 35 ; Aluminium. Teil B—Lieferung 1. Pp. ix + 308. Berlin: Verlag Chemie, G.m.b.H., 1933. 48 m. Subscription 42 m.

The part under review deals with the compounds formed by aluminium with hydrogen, oxygen, nitrogen, phosphorus, the halides, the sulphur family, and carbon. These include, of course, such salts as sulphates, phosphates, and cyanides and in fact most of the compounds of aluminium which contain the elements mentioned. Whatever happens to be known of the physical properties of the more important compounds is given in full detail. A great many double salts are described and the results of a number of phase-rule studies, both of melts and aqueous systems, are outlined, sometimes with graphical illustration. Ammines, hydrates, and co-ordination compounds formed by aluminium salts and organic materials are included. Statements, as is usual in the *Handbuch*, are always accompanied by reference to the original source. P. L. Robinson

Gmelins Handbuch der Anorganischen Chemie. 8th edition. Edited by the German Chemical Society. System-Number 59 : Eisen. Teil A-Lieferung 4. Pp. 587—846. Berlin : Verlag Chemie, 1932. 41 m. Subscription, 35.50.

Section A of the volume on iron treats of the metallurgy of the element and will be concluded by a further part to be published shortly. The present part deals with the methods employed in the manufacture of wrought iron and steel. It falls naturally into three sections ; the first concerned with wrought iron, the second with steel production by crucible, converter, and hearth processes, and the third, some 54 pages out of 259, with the use of the electric furnace in steel making. An interesting historical introduction is provided to every process and the chemistry of the operations, so far as it is known, is dealt with specifically by means of tabulated data, phase-rule diagrams, and plots showing the changes occurring in the molten metal during treatment. In addition to this liberal supply of graphs there are illustrations of puddling furnaces, mixers, converters, open-hearth and electric furnaces, which show, in addition to modern plant, some of the stages by which the evolution has taken place, and for every process an adequate account is given of the practical operations involved in its working. The utilization of electric current in induction and arc methods is described with the aid of simple diagrams, from which it is an easy step to the details of the actual

furnaces. The whole part is very fully furnished with references to the original literature, including that published in 1931. P. L. Robinson

Handbuch der Anorganischen Chemie: In Vier Bänden. Edited by Dr. R. Abegg, Dr. Fr. Auerbach and Dr. I. Koppel. Vol. 4. Division 3, Part 2, A, No. 2. Die Elemente der achten Gruppe des Periodischen Systems. Part 2. Eisen und Seine Verbindungen A, No. 2. Edited by Dr. I. Koppel. Pp. xii + 337—558. Leipzig: S. Hirzel, 1933. 21 rm.

This volume contains the following sections: Passivity, by G. Veszi; Corrosion, by G. Schikorr; The Systems Fe–O, Fe–C–H, Fe–H–O, and Fe–C–O (equilibria and reaction velocities), by K. Hofmann; Technical Processes in Relation to the Systems Fe–O, Fe–H–C, Fe–H–O, and Fe–C–O, by I. Koppel. The last section includes an account of scientific and technical investigations on the blast furnace, tempering, puddling, and cementation, and the section on corrosion also deals with the technical aspects.

The section on passivity is a well-balanced digest of the literature from Wenzel (1782) to 1932, and the discussion on corrosion deals methodically and concisely with an immense field, including numerous diagrams and 859 references, and also boiler corrosion. The discussion of the systems is particularly valuable, since the mass of conflicting literature has been most carefully sifted and the results brought together by means of numerous recalculations and graphs. The phenomena are very complex and if the wide differences in the results are considered, insufficiently investigated. A glance at Fig. 196, p. 479, will show how little reliance can be placed on existing results in many parts of this field. The new data for the $2CO \rightleftharpoons C + CO_2$ equilibrium form a useful supplement to the older information in Vol. III, Part 2, and again show disturbing variations. A useful summary of the thermodynamic data of ferrous metallurgy is given on p. 515. A full discussion of the equilibria is given, but it is emphasized on p. 522 that the operating conditions in the blast furnace are not such as to favour the attainment of equilibrium states. This volume of Abegg deals with subjects of great technical interest in a manner in every way worthy of the plan and high standard of the work. J. R. P.

Traité de Chimie Minérale. Edited by Prof. P. Pascal. Vol. IV. Antimoine, Bismuth, Vanadium, Niobium, Tantale, Bore. Pp. xxiii + 630. Paris: Masson et Cie., 1933. 120 fr.

This further volume of the important French treatise, like its predecessors, is very well printed on good paper, is exhaustive and provided with full references to the literature, including the most recent publications, but is unfortunately without any real index. The section on antimony (pp. 1—106) is up to date and adequate, and that on bismuth (pp. 107—202) gives a satisfactory account of the element and its compounds. The fact that bismuth trichloride is described by Boyle (Experiments Touching Colours, 1664, p. 147) is mentioned. The section on vanadium (pp. 203—375) is very complete. Vanadium occurs in the blood of ascidians (sea-squirts) in place of iron. The element is used in alloy steels to the extent of 0·7 to 1·3%, and it is of interest in relation to the nitriding process that such steels take up more nitrogen than ordinary steel. The catalytic actions of vanadium pentoxide in the synthesis of sulphur trioxide, and in the oxidation of anthracene to anthraquinone and of naphthalene to phthalic anhydride, are important technical processes. The organic derivatives of vanadium are included.

The sections on niobium and tantalum (pp. 377—516) are also very detailed. A tantalum-platinum alloy resists aqua regia, and alloys of tantalum with nickel, copper and tungsten may find technical applications. Metallic niobium is obtainable in silvery buttons by reducing the oxide at 1910° with hydrogen under 7 atm. pressure. The melting points are high (Nb 1700°, Ta 2850°). The curious behaviour of the electrical resistance of boron with temperature is described. Many borides of metals, including NiB_2, MnB, WB_2, FeB_2, and Fe_2B are described and some of these may find technical applications. The section on the hydrides of boron omits to mention that the gas obtained by the action of acid on beryllium boride is purer than that obtained from magnesium boride and is free from silicon hydrides. The section on the structure of the hydrides of boron is too scanty and is largely obsolete. No mention is made of the use of boric acid in the red glaze of Roman pottery (*terra sigillata*). The "perborates" are regarded as true persalts on the basis of some investigations of Menzel (1927), whose formulæ, containing quadrivalent boron and oxygen, seem very improbable.

This volume maintains the high standard of the work and, in addition to the very detailed survey of the pure chemistry of the substances, it gives a great number of references to industrial applications, some not very well known, as for example the use of bismuth trichloride in reducing the inflammability of tarred objects.

J. R. P.

Traité de Chimie Minérale. Edited by Prof. P. Pascal. Vol. V. Carbone - Silicium - Titane - Germanium - Zirconium - Celtium - Ammonium. By J. Amiel, J. Bardet, M. Billy, P. Brun, P. Camescasse, A. Mialhe, P. Pascal, M. Picon, H. Pied, M. Samsoen, A. Tchakirian. Pp. xxiii + 871. Paris: Masson et Cie., 1932. 165 fr.

Ten authors have assisted Prof. Pascal to write Volume V of this treatise, which in its scope and size resembles Newton Friend's Textbook more closely than Mellor's Comprehensive Treatise. Prof. Picon has written the chapter on carbon, J. Amiel that on the compounds of carbon with bivalent elements, and P. Brun that on cyanogen and its compounds with other elements. Prof. A. Mialhe contributes an interesting and useful chapter on the solid, liquid, and gaseous fuels which play such an important part in modern life. The section on silicon is the work of M. Samsoen, to which Prof. Pascal has added some pages on the nitrogen derivatives such as the silylamines and the silylimides. Chapters on titanium by M. Billy, germanium by J. Bardet and A. Tchakirian, zirconium and celtium (the name preferred to hafnium) by H. Pied and P. Camescasse, and the ammonium salts by Prof. Pascal complete the text.

The true quality of a treatise such as this can only be correctly judged after constant use over a period of time, but a cursory reading makes a favourable impression. The volume is well printed and spaced; the subject-matter is clearly presented and appears to be up to date, whilst the absence of abbreviations from the text is a matter for congratulation. The diagrams, although not numerous for a work of this size, are clearly printed if somewhat small, and selected physico-chemical data are also incorporated. Many unfamiliar compounds are briefly described and make the text sufficiently complete for most purposes. The mineral silicates are not treated collectively in this volume: they are reserved for separate discussion under the appropriate metals in succeeding volumes. The inclusion of the section on the ammonium salts seems out of place here and should have been made in or nearer to the volume which deals with nitrogen.

No claim is made that the references are exhaustive, but they are numerous and their arrangement is such that the authority for a statement in the text can quickly and easily be found. This is an excellent feature of the work which, unfortunately, is marred by the inconsistent and often incorrect ways in which abbreviations to the titles of a journal are made. Author's names are sometimes wrongly spelt and will look unfamiliar to an English reader. A little more care in this connexion would have removed an irritating blemish from a work which should prove of much value to many chemists. L. S. Theobald

Traité de Chimie Minérale. Edited by Prof. P. Pascal. Vol. XI. *Molybdène – Tungstène – Uranium – Thorium-Métaux de la Famille du Platine.* By C. Boulanger, R. Charonnat, M. Delépine, C. Duval, R. Flatt, L. Malaprade, P. Poulenc, A. Travers. Pp. xxiii + 836. Paris: Masson et Cie., 1932. 155 fr.

The sections contained in this volume, together with the dates of closing of bibliographies, are as follows: Molybdenum, by A. Travers (January 1, 1932); Tungsten, by A. Travers (January 1, 1932); Complex acids derived from molybdenum and from tungsten, by L. Malaprade (January 1, 1932); Uranium, by R. Flatt (June 30, 1932); Thorium, by C. Boulanger (December 31, 1931); Generalities on the platinum family, by C. Duval (January 1, 1930); Osmium, by R. Charonnat (January 1, 1932); Ruthenium, by R. Charonnat (January 1, 1932); Iridium, by M. Delépine (July 1, 1931); Rhodium, by P. Poulenc (no date); Platinum, by C. Duval (January 1, 1930); Palladium, by C. Duval (January 1, 1930).

The clear arrangement of subject-matter and the facility with which literature references are found in other volumes of this work have been mentioned by previous reviewers in these columns, and are, generally, well maintained. It should be emphasized that the method of treatment is critical and selective rather than exhaustive; that is to say, of Abegg or Friend rather than that of Gmelin or Mellor. Bearing in mind this limitation, it is interesting to see what gaps left by the four named works, and by Gmelin-Kraut, have been filled. The largest gap concerns the platinum metals, dealt with in Vol. IX, Pt. I (2nd ed., 1922) of Friend, but not yet in any of the other series. For the remaining metals the latest dates of publication are: Mo, 1931 (Mellor); W, 1933, (Gmelin); U 1932, (Mellor); Th, 1928 (Gmelin-Kraut).

It is perhaps not to be expected that a book of this scope would be free from weaknesses in details, including unevenness of treatment, of which the following have been observed: The account of the production of massive platinum (p. 600) is misleading in implying that only one method is now used. In an account of lithium platinocyanide (p. 687) the tri-hydrated formula is given weight by being placed in the heading, whilst it appears from the quoted evidence that the tetra-hydrated formula has at least an equal, and probably a greater claim to this distinction. On the same page much later work than that quoted for the double platinocyanide of Li and K is omitted. Chenevix (without the acute accent given in the text) believed at one time that Pd was composed of Pt and Hg, not of Ag and Hg as stated on p. 773. No mention at all is made of the radioactivity of Th; it is true that radioactivity is dealt with in volume VI, but on the other hand there are two pages on the radioactivity of U wisely given in the present volume. $W(CO)_6$ is not mentioned in the index and is found in the text in an account of the chemical properties of elementary W, whereas $Mo(CO)_6$, also not in the index, is found in an account of the chemical and physical properties of MoO_3. There are too many mis-spellings of authors' names. In the copy supplied for review there is a serious error in make-up; pp. 673—688 are duplicated and pp. 689—704 are missing. L. F. Gilbert

Secondary Aluminium. By R. J. Anderson, D.Sc. Pp. xv + 563. London: Chapman & Hall, Ltd., 1933. 42s.

The vast secondary aluminium industry of America is thoroughly reviewed in this book. The commercial and economic aspects, to which considerable space is devoted, are of main interest in America, but the technical side of the subject concerns metal melters of any country, and they will not fail to find it adequately described. Not only the secondary melter, but the foundryman also, will profit by reading this textbook on the intelligent use of scrap.

The kinds and sources of scrap, its contamination, sorting, grading, sampling, and assay are dealt with in Chapters II to VI. The technique of melting—the uses of fluxes, prevention of oxidation, refining—occupies Chapters VII to XIII, and the remaining chapters include a summary of the principal alloys in use at present, a discussion of the effects of impurities, and a description of technical control methods for secondary practice. Perhaps the most important purpose of the book is to point out the necessity for strict technical control of a product whose reputation is not unblemished. Dr. Anderson repeats himself many times in stressing the fact that it is fundamentally wrong to use expensive primary aluminium when the cheaper secondary product will give satisfactory results.

An excellent bibliography is provided at the end of each chapter, and both author- and subject-indexes are full and accurate. H. W. G. Hignett

PRACTICAL MICROSCOPICAL METALLOGRAPHY. By R. H. Greaves, D.Sc., and H. Wrighton. 2nd edition, revised and enlarged. Pp. xi + 256. London: Chapman & Hall, Ltd., 1933. 18s.

The second and much enlarged edition of "Practical Microscopical Metallography" remains, as the authors state, "essentially concerned with the methods and results of the examination of metals and alloys by the aid of the microscope." Bearing this in mind, the book is well compiled and little criticism can be made. Methods of examination are efficiently treated; the 60 pages descriptive of technique include a new chapter on low-power photomicrography and macrography.

Interspersed throughout six chapters devoted to iron and steels, more than 150 photomicrographs will give to the student some idea of the results of microscopic examination which have made possible a rapid clarification of our notions regarding the development and use of alloys. The microscope is shown also to be an indispensable instrument for solving practical troubles and saving time, one of its most valuable functions.

There is a great need for more books of this kind which deal with the structural intimacies of alloys less familiar than iron and steel. Copper, zinc, tin, and lead alloys are considered in this book in chapters all too brief. Lead–antimony alloys are dismissed in a few lines.

"Practical Microscopical Metallography" can be recommended to students and engineers. B. J.

A MANUAL OF PRACTICAL INORGANIC CHEMISTRY: QUALITATIVE ANALYSIS AND INORGANIC PREPARATIONS. By Dr. E. H. Riesenfeld. Translated by P. Rây, M.A. Pp. xxiii + 471. Calcutta: Chuckervertty, Chatterjee & Co.. 1933. Rs. 6; 9s.

This book is an authorized translation of the tenth edition of Prof. Riesenfeld's "Anorganisch-chemisches Praktikum," but it also embodies most of the new features of the eleventh edition of that work, which was published while this translation was in the press. That Prof. Riesenfeld's book is very popular among German-speaking teachers and students is clearly shown by the number of editions which has been published; and the reasons for this popularity are summarized by the translator in his preface—excellence of its method, judicious selection of up-to-date information compressed in a small volume, and the clarity of expression.

The essential purpose of the book is to introduce the student to preparative methods of inorganic chemistry and to qualitative analysis—a mission which it worthily fulfils. Much painstaking effort has been expended to inculcate not only a knowledge of practical chemistry, but the physico-chemical principles upon which the practical work is based. Opening with a section on general rules, the author deals in turn with manipulative methods, preliminary experiments and theoretical points, non-metals, and "important acids," the student being thus led to a study of qualitative analysis, in which the metals are treated in the reverse order to that usually adopted. In addition to the methods of separation and numerous characteristic reactions, the sections dealing with the groups and with the acid radicals contain details for the preparation of about sixty compounds. Other features of the book are a section dealing with the reactions of the rare elements and a series of tables. On the whole it is a very satisfactory book, the translation being excellent, but the printing and the quality of the paper leave much to be desired. W. H. B.

CALCULATIONS OF QUALITATIVE ANALYSIS. By C. J. Engelder, Ph.D. Pp. viii + 174. New York: J. Wiley & Sons; London: Chapman & Hall, Ltd., 1933. 12s. 6d.

Except in its earliest stages, when qualitative analysis means to the student little more than practice in technique and the recognition of related phenomena, intelligent work with test-tube and filter funnel needs to be securely based on quantitative and theoretical conceptions. It is one thing to notice that a precipitate is blue or pink or neither, another to put reasons for its appearance into words, and yet another to realize the exact conditions which determine its formation in different sets of circumstances. Whether one is concerned with the weight of a precipitate or with its mere existence or non-existence the same generalizations apply, the same theory and the same mathematics—only more of them—are in demand. This book contains a certain amount of simple arithmetic and elementary chemical theory, but it also deals clearly and usefully with matters like the equilibria of ionization, solubility products, complex ions, hydrolysis, and oxidation—reduction systems which are a frequent source of trouble to the student of qualitative analysis. It contains numerous worked examples, and provides 300 exercises, to half of which answers are given. Its use should facilitate the acquisition of a proper understanding of the meaning of, and reasons for, analytical procedure. A. A. E.

QUALITATIVE ORGANIC ANALYSIS: AN ELEMENTARY COURSE IN THE IDENTIFICATION OF ORGANIC COMPOUNDS. By O. Kamm. 2nd ed. Pp. ix + 311. New York: J. Wiley & Sons; London: Chapman & Hall, 1932. 16s. 6d.

This book offers a solid and comprehensive course in qualitative organic analysis, according to a scheme the author put into practice in the University of Illinois in 1920. Doubtless, as stated in the preface, qualitative organic analysis is an important factor in the training of the chemist; but this full course of 32 laboratory periods of three hours would in many instances make an unduly heavy demand upon the student's time-table. Assuming the requisite time to be available, the course is one which could hardly fail to afford its patrons a good grounding in this field of practical chemistry.

There is a preliminary theoretical discussion (113 pp.), followed by a practical section. The scheme here given for the identification of a single organic compound depends fundamentally upon observations of its solubility relationships, coupled with elementary analysis and determination of physical constants. A compact solubility table shows the division of organic compounds into seven solubility groups and various sub-groups, and there are related classified tables giving the names and physical constants of more than 2000 common

compounds grouped according to this general plan. The comprehensive working directions are supplemented by a useful chapter on the preparation of characteristic derivatives, with tables of melting points; there is also a chapter dealing with the quantitative analysis of substituent groups. The author's hints on the use and manipulation of small but fairly definite quantities of material are much to the point. JOHN READ

QUANTITATIVE CHEMICAL ANALYSIS. By G. McP. Smith. 3rd ed., revised and enlarged. Pp. xii + 199. New York: Macmillan Co., 1933. 12s.

Twelve years have passed since the second edition of this book was published. The new edition differs from its predecessor in several respects, the outstanding addition being the theoretical discussion and exercises on p_H values. As the book has been expressly designed for those students who are beginning the study of quantitative analysis, considerable attention is given to the theories and operations involved in quantitative work, no less than 60 pages being devoted to an account of the fundamental principles. Having thus laid a solid foundation Prof. Smith conducts the student along a systematic course of analysis, commencing with a series of simple gravimetric determinations, and followed by volumetric work, the latter including neutralization methods, methods of oxidation and reduction, and precipitation methods, this section being prefaced with a general discussion. The book concludes with a series of about 250 questions based on the text, 100 calculations, and an appendix containing some useful information, including details for the preparation of laboratory reagents. Throughout the experimental sections there is a wealth of detail. The book, which is well printed on good paper and strongly bound, can be recommended as a lucid exposition of the elementary principles of the subject. W. H. B.

DIE ELEKTROMETRISCHE (POTENTIOMETRISCHE) MASSANALYSE. By Dr. E. Müller. 5th revised and enlarged edition. Pp. x + 284. Dresden and Leipzig: T. Steinkopff, 1932. Paper, 14.50 rm.: bound, 16 rm.

The fact that Prof. Müller's treatise has reached its fifth edition in eleven years is adequate evidence of the increasing recognition of the importance of potentiometric titrations and the need of an authoritative work. Its value is all the more enhanced in that the book comes from the pen of one who has been responsible for the greatest advances in the development and application of potentiometric methods of analysis.

The first 68 pages of the volume are given over to the theoretical aspects of potentiometric titrations, the next 37 pages deal with the practical methods and the last 162 pages contain a brief résumé of the actual titrations. After a discussion of the rudiments of electrode potentials, there is developed in Section I the mathematical theory of potentiometric titration curves with especial emphasis of the conditions obtaining at end-points. The various methods of locating end-points are then described and are followed by the experimental determination of the "Umschlagspotential." The second section is well arranged and written, so also is the part of Section III dealing with oxidation-reduction reaction and titrations involving precipitations. The matter is up to date, but the treatment is perhaps a little too cursory.

The only weak spot in the volume is the concluding part of Section III in which acid-base titrations are described. No mention whatsoever is made of the glass electrode, the tungsten electrode is dismissed with a single reference, and in the discussion of the antimony electrode, the last paper to which reference is made bears the date of 1925. In all other respects the volume remains the standard work on potentiometric analysis.

H. T. S. B.

THE ANALYSIS OF OIL FOR THE PRODUCTION OF LUBRICANTS. By A. A. Ashworth, M.A. Pp. 63. London: E. Benn, Ltd., 1933. 9s.

In examining a crude petroleum with the object of determining its content of lubricating oils and of asphalt the distillation must be conducted with special technique if one is to avoid decomposing the most valuable components of the oil; for this reason conventional vacuum distillation is not sufficient and pipe still heating with flash vaporization must be employed.

During recent years Mr. Ashworth has developed a simple laboratory scale vacuum still which embodies the main features of a commercial pipe still unit and in this book he describes the construction, use and application of this apparatus. He gives an account, excellently illustrated by scale drawings, of the design and construction of the electrically heated pipe still, the flash chamber and the receivers for distillate and residue, and describes how the distillation is conducted. The refining operation consists of the conventional acid wash followed by filtration through active clay whereby the more detrimental impurities in the crude distillate are eliminated. The remaining chapters describe the redistillation of the refined oil from a glass flask into a series of fractions, the viscosities and specific gravities of these fractions and of the residue being determined by the usual methods.

The author, in his endeavour to maintain the whole operation on the simplest basis, however, makes the assumption that the oil is free from wax so that the amounts and qualities of the lubricants obtainable can be directly calculated from the qualities and yield of his final distillates. In the very common case of a waxy oil the whole of these assumptions collapse and a preliminary dewaxing becomes imperative. The practical value of the book would be greatly increased if a chapter on this subject were introduced.

It would perhaps have been wise of the author to point out that satisfactory reaction to tests for viscosity, resistance to oxidation and carbonization values are necessary before a viscous hydrocarbon can qualify as a lubricating oil in the modern sense of the term. The book is well printed and the constructional diagrams excellent, but the price is surprisingly high for a volume of 63 pages. F. B. THOLE

TRAITÉ DE BIOCOLLOÏDOLOGIE. By W. Kopaczewski. Vol. I.—PRATIQUE DES COLLOÏDES. 2nd ed. Part IV. MESURES OPTIQUES ET DONNÉES NUMÉRIQUES. Pp. 529—786. 1930, 40 f. Vol. II.—BIOCOLLOÏDES : ORIGINE, PRÉPARATION, PURIFICATION, PROPRIÉTÉS. Part I. GÉOCOLLOÏDES—PHYTOCOLLOÏDES. Pp. xv + 257. 1931, 40 f. Part II. ZOOCOLLOÏDES. Pp. 259—517. 1931, 40 f. Vol. III.—PHÉNOMENÈS COLLOÏDAUX. Part I. PHÉNOMENÈS DE CONTACT. PHÉNOMENÈS ELECTRO-CAPILLAIRES. Pp. viii + 168. 1932, 35 f. Part II. CONDITIONS D'ÉQUILIBRE DES COLLOÏDES. Pp. 169—363. 1932, 35 f. Part III. CARACTÈRES GÉNÉRAUX DE L'ÉTAT COLLOÏDAL. Pp. 365—592. 1933, 35 f. Paris : Gauthier-Villars & Cie.

The prospectus describes this work as "the first coherent attempt . . . to select well-established facts and to assemble the biological applications of our present knowledge regarding the colloidal state of matter." This claim appears to overlook H. Bechhold's "Die Kolloide in Biologie und Medizin," the fifth edition of which (585 pp.) appeared in 1929, but some remarks in the author's preface show that he is aware of its existence and considers it inadequate.

The three first instalments of the first volume, "Pratique des Colloïdes," have already been noticed in this JOURNAL ; the fourth is devoted to optical methods and numerical data. Like the previous ones it describes many methods and appliances which are in no way special to the study of colloids : colorimetry, polarimetry, and interferometry receive as much notice as ultramicroscopy and nephelometry.

The second volume bears the general title : "Biocolloïdes ; origine, préparation, purification, propriétés," and these bodies are classified as "Geocolloïdes, phytocolloïdes and zoocolloïdes," names which are intelligible but unnecessary. The classification is, as the author himself admits, not strict, since the proteins are all included under "Zoocolloïdes," nor is it easy to understand how "Geocolloïdes" come into the book at all. This section however contains, beyond chapters on soil colloids, clays, humic bodies, etc., an interesting chapter on mineral waters. The scope and method of this volume are set forth at length in a long, polemical, and slightly egotistic introduction. After finding fault with most of the methods of biochemistry and with all attempts to find structural formulæ for such compounds as starch because they are carried out on "the corpses of substances" only, it states that this work is neither a treatise on biochemistry as this is conceived at present, nor a treatise on the "technology of biocolloids," but a complement to all such works. This result is achieved by paying more attention to the colloidal properties or behaviour of the substances described than to their chemical constitution, a method of treatment which is perhaps not as novel as the author represents it to be. The principal carbohydrates and proteins are described in detail, as well as tannins, resins, lipoids, and pigments. An engaging feature of these chapters is the historical introduction which opens most of them : early workers receive full credit.

"Colloidal phenomena" are, unavoidably, referred to throughout the first and second volumes, but the reader will not find any general statement of what they are until he reaches the third volume which bears this title. This is a curious inversion of what most people would consider the natural sequence, and a similar absence of system governs the arrangement of the third volume. The author's intention seems, indeed, to be to produce a book differing as much as possible from all existing ones, disapproval of which he expresses wherever he can find an opening. In summarizing, the author presents the reader with the barren conclusion that "the colloidal state is an intermediate one between the state of solid and liquid suspensions, governed by physical laws, and the state of true solutions, governed chemical reactions." As a summary of the present position of colloid chemistry this is inadequate.

An historical review of early work does full justice to Baudrimont and Selmi. The author gives something new and historically interesting in his summary of Graham's work—a violent controversy between him and Dubrunfaut concerning priority in the discovery of dialysis. The discovery of this quarrel is interesting and, like a number of other historical items and the enormous lists of references at the end of every chapter, testifies to the author's diligence in collecting information. Unfortunately this diligence is not matched by equal powers of clear presentation and systematic arrangement, and the English reader will find most of the things contained in these volumes better put in accessible works.

E. HATSCHEK

INORGANIC COLLOID CHEMISTRY. By H. B. Weiser. Vol. I. COLLOIDAL ELEMENTS. Pp. xi + 389. New York : J. Wiley & Sons ; London : Chapman & Hall, Ltd., 1933. 28s.

The study of colloidal chemistry and its bearing on so many fields of science and industry makes the appearance of such a work as Prof. Weiser's an event of the utmost importance. Presumably the volume is the first of a series, and the author rightly presents the elemental colloids concerning which much is known. The work is replete with details which will be found extremely valuable both to the student and the industrial worker. It is divided into two parts dealing with the metallic and non-metallic elements, and every phase of colloidal behaviour is well and efficiently dealt with. The theories and conclusions of all the best-known workers in colloidal chemistry are embraced, and in particular, chapter 10 on "Colloidal Metals as Contact Catalysts" is an excellent summary of the position to-day.

At the same time it must not be concluded that these details are complete and sufficient. For example, the literature on the preparation of gold sols is reviewed and the author's own experience given at length on page 22. Zsigmondy's insistence on the use of conductivity water in its preparation is rightly criticized, and the necessity for absolute cleanliness of all apparatus and the absence of organic matter emphasized. Attention however is not drawn to the necessity for the absence of fumes in the atmosphere of the laboratory while the sol is being made—one of the most usual causes of failure. In addition, on page 3, when used for biological testing,

a most important feature, *i.e.*, hypersensitivity and the method for testing, is not mentioned.

Misprints also occur which will probably be corrected in the next edition: Thus on page 26, line 9, "greater" should obviously read "smaller." Page 313, line 22, for "Island" "Iceland." Page 366, line 2, "Selenium" should read "Tellurium." Page 66: The authors may be justified in criticizing Zsigmondy's work on the osmotic pressure of gold sols, but in general osmotic pressure determinations on colloids may be regarded as *un fait accompli*.

Minor discrepancies of this nature, however, do not detract from the general value of this work.

HANDBUCH DER BIOLOGISCHEN ARBEITSMETHODEN. Edited by Prof. Dr. E. Abderhalden. Alkaloide. By Prof. Dr. R. Seka. (2nd Supplement of Section I, Part 9.) Abt. 1, Chemische Methoden, Teil 11. Heft 6. Lieferung 417. Pp. 1069—1424. Berlin and Vienna: Urban & Schwarzenberg. 1933. 19 rm.

This volume forms the second addendum to the original article on the alkaloids, and covers the work carried out during the period 1927—1932. An excellent account of investigations on the constitution and synthesis of alkaloids is given, and the progress made in all the various alkaloid groups is so well reviewed that the book may be recommended cordially to all those wishing to learn the latest work in this field.

Perusal of the work reminds one that during this period important contributions have been made to our knowledge of many alkaloids of medicinal importance. Thus a full account is given of the changing views of the constitution of strychnine, of the relations between the various *Ephedra* alkaloids, and of the important investigations which have been recorded in the ergot field, whilst syntheses of hydroquinine and *dl*-hydrastine are given in detail. The rarer alkaloids, of scientific but little practical interest, are equally fully described.

The volume is well printed, and is very freely illustrated by structural formulæ. It represents excellent money's worth, costing only 19 rm. F. L. PYMAN

HANDBUCH DER BIOLOGISCHEN ARBEITSMETHODEN. Edited by Prof. Dr. E. Abderhalden. DAS CO-ENZYM DER ALKOHOLISCHEN GÄRUNG, DIE CO-ZYMASE, IHRE BESTIMMUNG UND ISOLIERUNG. By K. Myrbäck and H. v. Euler. EINE ENZYMATISCH-CHEMISCHE METHODE ZUR BESTIMMUNG VON ZITRONENSÄURE. By T. Thunberg. KARBOHYDRASEN. By R. Weidenhagen. ABT. IV, ANGEWANDTE CHEMISCHE UND PHYSIKALISCHE METHODEN TEIL 1, HEFT 7, LEIFERUNG 414. Pp. 2009—2088. Berlin and Vienna: Urban & Schwarzenberg, 1933. 4 rm.

This section of this never-ending book is part of the volume dealing with the chemical and physical methods of biology. Myrbäck and Euler describe in eight pages the isolation and estimation of the co-zymase of yeast. Thunberg describes at some length—34 pages—an enzymatic method of determining citric acid which will detect it in a dilution of 1 in 50,000 or less. A special apparatus is required. An article by Weidenhagen on the carbohydrate enzymes summarizes his own work on invertase and that of Helferich on emulsin, and describes the measurement of the activity of maltase, invertase, emulsin, melibiase, and lactase. The use of phenylglucosides instead of methylglucosides as substrates allows of a much more sensitive test of enzyme activity. E. F. A.

GRUNDLAGE DER CHEMIE UND BIOCHEMIE DER ZUCKERARTEN. By K. Bernhauer. Pp. xi + 365. Berlin: J. Springer, 1933. Paper, 32 rm.; bound, 33.80 rm.

The author, who is director of the Biochemical Department of the Chemical Laboratory at the German University in Prague, intends his book to enable those interested to acquire a rapid familiarization with the present position of sugar chemistry, including the purely chemical as well as the biological degradation of the sugars.

The work is divided into four parts. The first deals with the constitutional and structural chemistry of the different sugars and polysaccharides, the second with the purely chemical, and the third with the biological degradation of the sugars. The fourth part deals with the relation of the sugars and their degradation products to a variety of classes of natural products occurring in plants and in animals. It is probably the first time that this problem has been sufficiently stressed in a text book and marks the realization that the problem of biosynthesis, and the achievement of the synthesis of natural products in ways similar to those which are used by the living cell, will (or should) receive the increasing attention of organic chemists.

The problem of sugar degradation is treated very well and very fully, somewhat to the exclusion of other important problems, such as that of the relation of stereochemical configuration to biological behaviour, which has so many illustrations in the action of enzymes and in immunological reactions. On the other hand, much of the experimental work in this field still lacks an interpretation.

The material is well presented and thoroughly documented. There is an excellent index and few typographical errors have been noticed. It should prove a useful book to those who can afford to possess it.

K. F. A.

PRACTICAL PHYSIOLOGICAL CHEMISTRY. By S. W. Cole, M.A. 9th ed. Pp. xii + 419. Cambridge: W. Heffer & Sons, 1933. 12s. 6d.

The latest edition of this book should be universally welcomed by all biochemists, physiologists, and medical students. "Cole" has for many years been the standard textbook from which the medical student acquires a knowledge of biochemistry and thus obtains an insight into clinical medicine. First published in 1904 it has grown with the science of biochemistry from very humble beginnings to its present size and importance. The eighth edition is now five years out of date and in the interval so much has been discovered in the subject that the book has had to be almost entirely rewritten. Much has been added, but much extraneous matter has been cut out, and by the use of a new type and setting (which in no way detract from the appearance) the size

and price of the book have been reduced, the latter to a very modest sum for a scientific work.

The chapters on p_H and other aspects of physical chemistry have been greatly enlarged, as have those on blood pigments and oxidations, branches of the subject that have grown out of all recognition since the previous edition. Several new and improved analytical methods have been introduced, notably the author's own methods for the estimation of urea using urease and of reducing sugars using potassium ferricyanide and methylene blue. In fact a particularly marked feature is the number of tests and methods of preparation directly due to the author, who has worked unremittingly for many years to improve and extend the science of medical chemistry.

L. M. M.

PRINCIPLES OF FRUIT PRESERVATION: JAM MAKING, CANNING, AND DRYING. By T. N. Morris, M.A. Series of Monographs on Applied Chemistry. Vol. 6. Edited by E. H. Tripp, Ph.D. Pp. xiii + 239. London: Chapman & Hall, Ltd., 1933. 15s.

During the last few years the number of publications of a scientific or pseudo-scientific nature dealing with the subject of this monograph has increased rapidly and it is difficult for the chemist, even though he be closely associated with the practical side of the industry, to sift the corn from the chaff. Mr. Morris has undertaken this sorting process; he has aimed at the presentation of the most important published work on the preservation of fruit in all its aspects and has included some hitherto unpublished results. Incidentally it is surprising to find no section dealing with either candied or crystallized fruit or peel, both very ancient and popular types of preservation.

A preliminary chapter deals with the composition of fruit. This, whilst being indicative, might possibly have been a little more comprehensive. Part I under the heading "Jams and Jellies" has two excellent chapters on pectin-sugar-acid gel; the inclusion of some important original work by Ogg gives special value to this section; the manufacture of pectin is described in some detail. Different methods employed for storage of fruit for jam are given, but no recipes for the preparation of pulp are included. The Food Manufacturers' Standards for Jam are set out in full. Methods of manufacture of jam are given, and a suggested method of control for the information of the chemist attached to the factory is described. Whilst in practice each chemist has to develop his own particular methods with due reference to the factory itself, the ideas put forward are sound and will aid any one entering the industry.

The canning of fruit is dealt with in Part II in a similar way; guiding principles necessary for the production of a satisfactory product are laid down and explained but few mechanical details are mentioned. Reasons for and the prevention of spoilage are given in detail. Tests necessary for the examination of the raw material are described, but the examination of the finished product is hardly considered; this part might with advantage, have been amplified.

The third section, on dried fruit, describes the analysis, preparation, and storage of the main varieties of dried fruit: it includes also a chapter on the principles of dehydration. Part IV consists of a chapter on vitamins in fruit products and another on the causes of discoloration and its prevention in those products.

The text is well supplied with diagrams and references, but very few illustrations are given of the large-scale processes in operation. This is however to be expected since the book is concerned with principles. The book is well printed, and is to be recommended to all concerned with fruit preservation.

L. H. L.

UNSERE LEBENSMITTEL UND IHRE VERÄNDERUNGEN. Mit einer Darstellung der Lehre von der Kochwissenschaft. By Dr. W. Ziegelmayer. Pp. xv + 324. Dresden and Leipzig: T. Steinkopff, 1933. Paper, 10 rm.; bound, 11.20 rm.

The primary aim of the book is to give instruction on the handling and preservation of foods in order to prevent or limit the loss in food value due to deterioration in quality and spoilage. It aims further at describing how the science of cookery should be taught, and at linking it up with chemistry, nutrition, food investigation, physiology, hygiene, and housekeeping. The book is intended primarily for use in hospitals and clinics and by students of dietetics and household science, to serve as a bridge between theoretical and practical instruction, and to such it should be invaluable.

The subject-matter is divided into several main classes; a study is made of the changes occurring in foods (1) before and after purchase; (2) through the action of heat; (3) through the action of cold; (4) through contact with cooking and preserving vessels; (5) through the action of cell ferments or enzymes; (6) through storage; (7) through the action of micro-organisms; and (8) changes due to methods of production and manufacture. The different types of foodstuffs are considered under each of these heads, and detailed analyses of the chemical composition are given in many cases. A further section deals with the different methods of food preservation, *e.g.*, by sterilization, use of preservatives, etc.

Recent developments in the preparation of food are mentioned in some detail, *e.g.*, by electricity and by high-pressure steam, and materials to be used for further processes are given due consideration. Quick freezing is described, but reference is only made to the Birdseye Process—the Paterson and "Z" processes being ignored.

There are a number of minor errors and in many cases undue prominence is given to the work of one author at the expense of others; hypotheses are sometimes stated as facts.

As an example of the method of calculating the cost of a calorie, the tables given may be of some use, but it must be remembered they are local, being based on prices in Germany in 1927.

The final section consists of a practical course to be carried out by students of dietetics and household science.

The arrangement of the bibliography is far from satisfactory. Many authors are mentioned without reference to the journal in which their work was published, some references are given in footnotes to chapters, whilst at the end of the work there is a list so short that it is worse than useless.

To sum up, the subject is considered from the nutritional, chemical, and economic points of view. Much of the chemical work has probably not appeared elsewhere, or at any rate not in collected form, and the book should form a useful contribution to food literature.

L. H. LAMPITT

STEREOCHEMIE: EINE ZUSAMMENFASSUNG DER ERGEBNISSE, GRUNDLAGEN UND PROBLEME. Edited by K. Freudenberg. Pp. 1377. Leipzig and Vienna: Franz Deuticke, 1933. 154.80 m. (exclusive of index).

Nearly 30 years have elapsed since the appearance of the last comprehensive work on stereochemistry, viz., Alfred Werner's *Lehrbuch der Stereochemie*, published in 1904.

During this period there has been so great an increase in our knowledge of molecular configuration that it has become almost beyond the power of any single individual to produce a treatise dealing with the whole subject on a scale corresponding with that of Werner's book. Not only has the extent of stereochemical knowledge greatly increased, but entirely new methods of investigation have been introduced. The methods of the classical stereochemistry were chemical; they were based on the investigation of isomerism, optical and geometrical. The newer methods are physical. They depend on the study of various classes of spectra, or of molecular dipole moments. The older and newer methods are complementary and each has its special sphere of usefulness. A full appreciation of modern stereochemistry entails a great diversity of outlook, and the newer methods of attack need specialized techniques which can only be acquired through considerable experience.

This new treatise on stereochemistry has been prepared by Prof. Freudenberg with the collaboration of a group of 16 specialists, each of whom is a prominent worker in that branch of the subject to which his contribution relates. It cannot fail to be a great advantage to the workers in each branch to have available—"under one roof"—as Prof. Freudenberg expresses it—these authoritative accounts of the results which have been obtained by the different types of investigation.

The book is a treatise of 1377 pages, divided into three volumes. The first deals with general and physical stereochemistry, the second with the stereochemistry of carbon, and the third with the stereochemistry of the elements other than carbon.

In the first volume an account is given of the physical methods of investigating molecular configuration and of the results to which they have led. Among various contributors, Prof. H. Mark describes the methods based on *X*-ray interference, Prof. Victor Goldschmidt contributes a valuable section in which he outlines the methods of determining atomic and ionic radii and shows how the conception of a crystal as an array of spherical units to which definite radii may be assigned has thrown light on problems of crystal structure, and K. L. Wolf and O. Fuchs discuss the evidence provided by electrical dipole moments and give a collection of data, including references and indication of the methods used, which is probably the most complete at present available. Raman spectra are dealt with by A. Dadieu.

In these accounts the experimental methods are described in outline only. The chief stress is laid on the underlying principles and results, and the non-specialist should find them helpful in assisting him to assess the degree of reliability to be attached to conclusions drawn from different physical data. From this point of view the historical account given by Prof. Mark of the investigation of the crystal structure of pentaerythritol is interesting. He explains in some detail how the earlier deduction from *X*-ray diagrams that the valencies of the central carbon atom in the molecule of this compound have a pyramidal arrangement was corrected by further investigation.

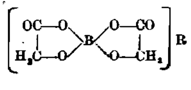
The relations between circular dichroism, circular double refraction and optical rotation, which are so important in relation to the study of the quantitative aspects of molecular rotation, are very fully dealt with by Prof. Werner Kuhn, who includes a treatment of the subject based on his model of a pair of coupled oscillators, separated by a finite distance, with their axes of vibration not parallel.

Of the various sections in the second volume perhaps the most interesting is that by Prof. Freudenberg on the ingenious methods, many due to himself and his co-workers, which have been employed to determine the relative configurations of the asymmetric carbon atoms in related series of optically active compounds. Compounds with molecular dissymmetry but no asymmetric carbon atom are dealt with by Prof. Richard Kuhn. In this connexion Prof. Kuhn introduces the convenient term *atropic* (α and τροπή a turning) to designate isomers, which, like the antimeric forms of certain substituted diphenic acids and 1:8-di-substitution derivatives of naphthalene and quinoline, owe their more or less permanent existence to the limitation of free rotation about a single bond.

The larger part of the third volume consists of a very complete and well-balanced account of the stereochemistry of nitrogen in its various states of combination written by Prof. Meisenheimer, who has contributed so much to our knowledge of this part of the subject, and Dr. Theilacker.

The final section, on the stereochemistry of complex compounds, is contributed by Prof. Pfeiffer. While it presents a valuable and comprehensive account of what is known in connexion with the molecular configuration of the co-ordination compounds of the metals, it seems open to some criticism by reason of the way in which the co-ordinate link is treated. The idea of "subsidiary valencies," which Werner introduced to allow of the attachment to the central atom of more groups than the ordinary valency permitted, is not only retained, but the distinction between "principal" and "subsidiary" valencies is even emphasized.

For example, cyclic compounds are classified according to the number of "subsidiary" valencies included in the ring, and formulæ such as



n which "subsidiary" valencies are distinguished by dotted lines, are employed.

The knowledge accumulating with regard to the nature of valency makes it increasingly probable that the links which unite the central atom of a co-ordinated system to the attached groups are all co-valencies consisting of a pair of shared electrons, and are thus all valencies of the same order. Where there is reason to believe that the shared electrons are both derived from the same atom it may be convenient to use some special symbol for the bond (like the arrow employed by Sidgwick), but the differentiation of the valency bonds of a co-ordinated atom into "principal" and "subsidiary" valencies (leading, as in the formula of the boron compound reproduced above, to the indication of differences devoid of theoretical or experimental support) seems like reverting to the chemistry of the last century. Also, although the weight of evidence seems at the present time to be in favour of formulæ for nitro-compounds and oxime N-ethers in which the nitrogen is 4-co-valent, the latter compounds are in this volume given formulæ of the type $R_2C{:}N(CH_3){:}O$, in which the nitrogen is 5-co-valent. However, these are not points to be unduly stressed, and in the book as a whole the subject matter is treated from the most modern points of view.

By providing an orderly, authoritative, and exhaustive presentation of the results achieved by the different methods of stereochemical investigation this treatise cannot fail to promote the progress of stereochemistry. It is a book of reference which can be consulted with confidence for the facts and theories of this branch of the science and as a guide to point the way to new problems for investigations. Chemists are much indebted to Prof. Freudenberg for so admirable a work, and it is greatly to be regretted that the price at which it is published is so high as to be prohibitive to most private individuals and many libraries. W. H. Mills

Hydrogen Ion Concentration and its Practical Application. By F. L. La Motte, W. R. Kenny, and A. B. Reed. Pp. vii + 262. London: Ballière, Tindall & Cox, 1932. 20s.

A strong point about this book is its eminently practical bias. Much has been written in the past from which one might suppose that p_H is an item of information worth having for its own sake; this it is not, and it is only when one knows exactly what importance attaches to a particular p_H for the particular substance and circumstances that it becomes worth while to spend time and energy on its determination. The authors of this book have provided this information for a wide variety of substances and circumstances. The bulk of the volume is devoted to explaining the use and significance of the p_H value to the ordinary works chemist when he has got it. Before this comes precise information as to exactly what it means and how quickly and readily to determine it by colorimetric methods. There are briefly touched upon questions of water supply, corrosion problems, sewage disposal, sugar manufacture, gelatin and glue, leather, textiles, pulp and paper, food industries, cleaning processes, electro-deposition of metals, bacteriological and pathological methods, and then there is a long chapter on soils. From the range of this list it will be seen how wide is the field in which the concept of hydrogen ion has made itself useful and affords more information than the old-time determination of acidity. The amount of information under the various heads differs much; throughout the reader is left with a thirst for more, and all too often the authors leave off just where one would like them to go on. There are, however, many useful suggestions which may help in overcoming difficulties in technical or laboratory operations.

The book is well written. The methods described are however exclusively colorimetric and there is no treatment of the electrical methods which are in some circumstances superior. H. E. Cox

Spectroscopy in Science and Industry. By Dr. S. Judd Lewis, D.Sc., F.I.C. Pp. vi + 94. London: Blackie & Son, 1933. 3s. 6d.

In this atractive little book Dr. Judd Lewis has given a useful introductory account of spectroscopic methods of examination and their place in industrial practice. Particular attention is paid to quantitative spectroscopy, and the "ratio quantitative system" is described. The chapter on industrial and scientific applications of emission spectrum analysis contains references to metallic analyses, the discovery of elements, the examination of the ash of organic substances and the residues of natural waters, the detection of metals in oil and the contamination of foodstuffs. The applications of absorption spectroscopy include the identification of dyes, the detection and determination of alkaloids, the examination of glasses prepared for special purposes, such as the transmission or exclusion of ultra-violet rays, and the investigation of films and fabrics. A brief account is also given of spectrophotometry. As the author remarks in his preface, it is surprising how often a few parts per million of some seemingly harmless impurity affect the industrial uses of a metal, glass, or other material. That alone is sufficient excuse for the publication of a review, in simple terms, of the kind of service which modern spectroscopy can render in such cases, and of the means by which the desired goal may be reached. A. A. E.

Optische Messungen des Chemikers und des Mediziners. By Dr. F. Löwe. 2nd enlarged and revised edition. Technische Fortschrittsberichte: Fortschritte der chem. Technologie in Einzeldarstellungen. Edited by Prof. Dr. B. Rassow. Vol. VI. Pp. xii + 205. Dresden and Leipzig: T. Steinkopff, 1933. Paper, 9 rm.; bound, 10 rm.

This book is a comprehensive survey of optical measurements of many kinds determinable for the most part with instruments made by the firm of Karl Zeiss, although a few references are made to British designs, with just occasional mention of French, Swedish and other equipment. While the bibliography is not exclusively German, the great preponderance of the references is to original papers in German journals. The subjects are treated mainly from the point of view of the general analytical laboratory, rather than of the industrial technological establishment. Thus, most

fields cultivated by the food analyst, the pharmacist, the biochemist and the medical man may be further studied by some of the numerous apparatus described.

Rather more than one half of the book is devoted to spectroscopy. A large part of this is taken up with various quantitative methods, and here it is noticeable that several other countries share equal honours with Germany. A good bibliography referring to this section indicates the rapid progress made during the last five years. Apart from the classic work of Hartley and his school in Dublin, and a few specialised efforts elsewhere, one finds the researches of the Rumanian chemist, T. Negresco, published in Paris only in 1927, figuring as the most ancient. Since then half a dozen good systematic methods have acquired prominent positions in the list, signifying a mighty wave of enthusiasm for the new possibility and foreshadowing a day not far distant when spectroscopy will demand the attention of every practical chemist.

The second chapter deals with photometry in the service of chemists and medical men. This finds expression in describing apparatus and enunciating principles for the practice of colorimetry, nephelometry, polarimetry and fluorescence, with scant attention to the objects which may be achieved. On the other hand, in the next chapter, little is said about instruments used in refractometry, but numerous applications are cited.

The last chapter will prove valuable to those seeking information on the possibility of inquiring into the nature of gases, natural waters, biological materials and the like by means of interferometry. S. JUDD LEWIS

PHYSICO-CHEMICAL METHODS. By J. Reilly, M.A., D.Sc., and W. N. Rae, M.A. With a Foreword by F. G. Donnan, M.A., D.Sc., LL.D., F.R.S. 2nd ed., revised. Pp. xv + 822. London: Methuen & Co., 1933. 42s.

The second edition of this book will be welcomed by all who are interested in the technique of physical chemistry. Considerable alterations have been introduced into the text, and these alterations, together with the large amount of new material, have considerably enhanced the value of the work. In the attempt to bring the information up to date, twenty new chapters have been introduced on subjects such as the Raman effect, X-ray spectroscopy, and the thermionic vacuum tube.

Possibly some of these alterations were inspired by the review of the first edition, which suggested that when certain improvements had been effected the work might be worthy of a place beside "Ostwald-Luther." Some of the minor blemishes are still to be found. The illustrations, which are a valuable feature of the book, are still sometimes lacking in finish. The rapid advances in experimental technique render it ever more difficult to produce the perfect textbook. Realizing this difficulty, the following criticisms are offered as constructive suggestions, and in the belief that in most ways the new edition will bear comparison successfully with the German books.

It is impossible in a book of eight hundred pages to give practical details of all the operations that are used in the physico-chemical laboratory. One of the weaknesses of the book has arisen from the attempt to do this. The result has been that the treatment becomes superficial, and further literature has to be consulted if the experiment is to be carried out satisfactorily. In such cases it would be better if full details were given of where to find the required information, and the space saved devoted to amplifying the descriptions of those processes that are sufficiently important to be described in the textbook. For example, the space devoted to the sections on photography and glass-blowing is largely wasted, for in practice other sources of information would certainly have to be consulted: similarly the description of elementary glass-blowing is insufficient to enable a proper technique to be acquired. In the bibliography of the latter subject the textbook by Carl Woytacek, "Lehrbuch der Glasblaserei" (1932) ought to have found a place. If space could have been saved, some of the chapters on the fundamentals of laboratory technique might have been less disappointing. The chapter on thermostats is short and unimaginative considering the importance of temperature control in all physico-chemical measurements. Similarly, the production, measurement, and right understanding of high-vacuum practice is required for a large number of precision measurements. Yet the treatment of all these points is unsatisfactory. The mercury vapour pumps described are mainly old types. No methods are given of finding leaks in vacuum lines or the measurement of low pressures with electrical devices. Similarly, the method first developed by Stock for purifying gases by distillation at low temperatures is not mentioned.

To counterbalance these omissions, there is an enormous amount of useful information in the book and, as Prof. Donnan remarks in a foreword, "no serious student of chemical science can afford to dispense with this important treatise." R. H. PURCELL

DIE ALKALICHLORIDELEKTROLYSE IN DIAPHRAGMAZELLEN: EINE THEORETISCHE UND EXPERIMENTELLE UNTERSUCHUNG. By G. Angel. Pp. 126. Berlin: Verlag Chemie, 1933. 12 m.

The manufacture of alkali and chlorine by the electrolysis of brine in diaphragm cells constitutes the basis of several important processes, and a detailed study of the phenomena is therefore of interest. The present account deals solely with small-scale laboratory experiments and includes an account of older work. A second part is promised, in which is a theory of electrolysis based on new conceptions, with special reference to practical operation. A large part of the present monograph is concerned with the calculation of the composition of the electrolyte with reference to the current efficiency. The practical side is emphasized and the whole is what should be expected from the research laboratory of an industrial undertaking rather than an academic laboratory. It is, therefore, not easy to say how far the results will be found useful and suggestive by those to whom the book will appeal, the chemists and engineers in charge of electrolytic alkali works, and particularly in how far the experiments with the small laboratory cell are likely to be reproduced in technical cells. The broad general results, however, can hardly fail to be of interest in a field where

technical success has perhaps been achieved more by careful attention to empirical methods of control than by the application of general principles. J. R. P.

PHASE RULE STUDIES: AN INTRODUCTION TO THE PHASE THEORY. By J. E. Wynfield Rhodes, B.Sc. With an Introduction by E. L. Rhead, F.I.C., M.Sc. Pp. x + 131. London: H. Milford, Oxford University Press, 1933. 6s.

The need for a concise and clear introduction to the study of the phase rule has been felt for a long time, the only book available, "The Phase Rule and its Applications" by A. Findlay, being rather too detailed for the requirements of many readers. The above volume, by Mr. Wynfield Rhodes, satisfies this need admirably. It is assured of a wide circulation among chemistry students in the universities and those outside who wish to obtain a general outline of the methods of representing equilibria with the aid of phase diagrams before proceeding to their application in a specialized field.

The treatment of the subject is practical; the author starts with the definitions of components, phases, degrees of freedom etc., without considering the possibility of their deduction from thermodynamic principles, or the history of their application by van d'Waals and Bakhuis Roozeboom. Indeed it is probably unique among textbooks of the subject in not mentioning their names. Roozeboom's work "Die Heterogenen Gleichgewichte vom Standpunkte der Phasenlehre" is even ignored in the bibliography where English references only are given. The consideration of condensed systems of one, two, and three components which constitutes the greater part of the volume is excellent. A large amount of information is given in the minimum of space in a simple and unambiguous style. The study of equilibria involving gases and vapours was obviously precluded from considerations of space, although a start is made in the chapter on "Miscellaneous Applications." It is unfortunate that this was not developed further in place of a rather unsatisfactory chapter on "Experimental Methods employed in Phase Rule Work" which will convey nothing new to the majority of readers.

R. H. PURCELL

DIE LÖSUNGSGLEICHGEWICHTE DER SYSTEME DER SALZE OZEANISCHER SALZABLAGERUNGEN. By J. D'Ans. Edited by the Kali-Forschungs-Anstalt G.m.b.H. Pp. vii + 254. Berlin: Verlagsges., für Ackerbau m.b.H., 1933.

It is now thirty years since van't Hoff and his collaborators carried out their classical phase-rule studies of the formation of sea salt deposits. Since the publication of the famous "Ozeanische Salzablagerungen," a great deal of very valuable work has been done in this field. To gather up all the results of this work, and to criticize and present them in a systematic and well-documented form presented a task of some difficulty but one of very real importance. This task has been performed with conspicuous success in the present volume.

In the first fifty pages, the special technique required in phase-rule investigations is clearly and thoroughly described, special attention being given to such matters as the measurement of solubility, the determination of critical points, and the representation of equilibrium data by means of diagrams and space models. The essential features of the more important binary, tertiary, and quaternary systems that may occur with water, and the chlorides and sulphates of sodium, potassium, and magnesium as components, are then described in a very clear and systematic manner. The corresponding solubility data are clearly arranged in tabular form and are also represented graphically in the diagrams given in the supplement. A considerable amount of space is then devoted to a description of the more important quinary systems and the volume closes with a valuable account of the various systems which result from the inclusion of calcium chloride or calcium sulphate as a primary component. The value of the book as a work of reference is greatly augmented by the inclusion of a very good bibliography of this extensive and somewhat scattered literature.

The book is undoubtedly of great value as an up-to-date account by an expert of the work that has been done in this important field. W. E. G.

KINETICS OF CHEMICAL CHANGE IN GASEOUS SYSTEMS. By C. N. Hinshelwood, M.A., F.R.S. 3rd ed. Pp. vi + 392. Oxford: Clarendon Press; London: H. Milford, Oxford University Press, 1933. 15s.

During the four years that have elapsed since the publication of the second edition of this book, much attention has been paid by investigators to the subject of the mechanism of chemical change in gaseous systems. The author has, therefore, had the task of bringing a considerable body of fresh material under review, and this is reflected by an increase in the size of the work from 266 pages to 392 pages. Among the principal fresh features are (1) a new chapter on catalysis in gas reactions, in which is incorporated also an interesting comparison with reactions in liquid media, and (2) an introductory account of the new quantum theory with particular reference to its application to the simpler chemical reactions, while the chapter on chain reactions has been very considerably lengthened.

The subject is one of growing complexity, but, as in the two previous editions, the author has succeeded in producing an eminently readable, clear, and well-balanced account of our knowledge of gas reactions. The book is indispensable to all students of physical chemistry, and it may be heartily recommended to all who are interested in one of the fundamental problems of chemistry, the mechanism of chemical reaction.

R. O. G.

COTTON EFFECT AND RELATED PHENOMENA. By S. Mitchell, D.Sc. Monographs on Modern Chemistry. Edited by Prof. J. Kendall, M.A., D.Sc., F.R.S., and Prof. J. Read, M.A., B.Sc., Ph.D. Pp. vii + 92. London: G. Bell & Sons, Ltd., 1933. 7s. 6d.

This little book reads like an essay rather than a textbook, and should help to make more popular a subject which is likely to remain obscure to all but the few. The book opens with a description of the simple laws of refraction and leads on through normal and anomalous dispersion, rotatory dispersion, plane, circular

and elliptical polarization and kindred subjects, until it arrives at a brief description of the Cotton effect (on p. 21) and circular dichroism.

Chapter II embodies in nine pages the usual well-known principles of absorption spectra and spectrophotometry, but only in just sufficient detail to develop the feature of main interest, namely, that referring to absorption curves resulting from right- and left-handed circularly polarized light. Chapter III is devoted to "Theoretical Considerations," followed by the measurement of rotation and ellipticity with modern instruments, and this again with a record of work done on rotatory dispersion and circular dichroism by Tschugaev and others, mostly on terpene and similar derivatives. Several optically active compounds of cobalt, chromium, iridium, and rhodium of the tri-oxalate type show the Cotton effect.

Finally, there is a summary of "Significance of the Results" and an "Appendix" describing "models," followed by a bibliography of 125 entries and good subject and author indexes. Altogether the book should be cordially welcomed and found very valuable as an introduction to the subject and as a guide to the literature. The descriptive definitions are, no doubt, efficient, but the absence of precise definitions of the more conventional style may, perhaps, leave the main theme a little ambiguous to the reader approaching the study for the first time. The book is well produced.

S. JUDD LEWIS

LIPOIDE UND IONEN: EINE ALLGEMEIN BIOLOGISCHE UND ÄRZTLICHE STUDIE ÜBER DIE PHYSIOLOGISCHE BEDEUTUNG DER ZELL-LIPOIDE. By Prof. Dr. R. Degkwitz. Wissenschaftliche Forschungsberichte Naturwissenschaftliche Reihe. Edited by Dr. R. E. Liesegang. Vol. XXXI. Pp. xvi + 328. Dresden and Leipzig: T. Steinkopff, 1933. Paper, 18 rm.; bound, 19.50 rm.

The subject of lipoids and emulsions is by no means easy to study especially in its physiological aspect and though the book before us is intended for biologists and medical scientists, a considerable knowledge of physics is required for its understanding. The whole subject of emulsions is one of the utmost importance in biology as indeed also in many branches of industry, but it badly needs a master hand to bring some sort of order and clarity into it; the same criticism applies to the present book, which the reviewer has found most difficult to read, so that it can be commended only to experts.

It is to be emphasized that whereas a complete knowledge of all the constituents of the cell and their mutual chemical interactions is of importance, a good deal more knowledge is required of the manner in which the forces which control them exercise their action. Reactions between lipoids in emulsions are not directly comparable with those in solution. So complex a terminology is now necessary in these fields that the layman chemist requires to read it with a dictionary in his hands.

The book starts with a definition of the lipoids and puts the question whether their physiological action is chemical or physical in nature, preference being given to the latter alternative. Subsequent sections are headed Lipoids and Lipoid Antagonism, Surface Tension Surface Energy, the Physical Properties of Polyp Systems, and the Action of Cell Lipoids; the la section deals particularly with the action of cholest and lecithin on individual cells and organs, and incl such subjects as lipoid feeding and injection.

E. F. A

DIE INDUSTRIELLE HERSTELLUNG VON WASSERST By Dr. H. Pincass. TECHNISCHE FORTSCHRI BERICHTE. FORTSCHRITTE DER CHEM. TECHNOLO IN EINZELDARSTELLUNG. Edited by Prof. Dr. Rassow. Vol. XXIX. Pp. 82. Dresden Leipzig: T. Steinkopff, 1933. Paper, 6.50 r bound, 7.30 rm.

The technical importance of hydrogen and the ext sive literature on the subject, including patent sp fications, make it desirable to have a concise mod survey of the subject. In a limited space the pres monograph provides an excellent summary cover a wide field. The older and well tried methods obtaining hydrogen depend on the suitable treatm of water gas and coke-oven gas, the action of heated ir on steam, the silicol process and the electrolysis water. More recent processes include the cracking hydrocarbons, the action of phosphorus vapour steam with the simultaneous production of phospho acid, and the cracking of synthetic ammonia. In section on electrolytic hydrogen, the methods of press electrolysis of Noeggerath and Fauser are briefly a critically considered, along with Holmboe's claim t electrolytic hydrogen is more active in synthesis th ordinary pure hydrogen. Various modern types electrolytic cell are described and illustrated, the l type being most used in England and America, and t bipolar electrode (filter-press) type in Germany. appendix deals with atomic hydrogen. The econor section gives a survey of modern costs, from which t author concludes that for large installations the wa gas and coke-oven gas methods are most economic and, with scientific operation, can exist together. T electrolytic processes depend on cheap power and t cracking process on cheap natural gas. The iron proc provides a gas suitable for hydrogenation and can successfully operated where coal measures and coki plants are as remote as cheap electricity. The ph phoru sprocess appears to be economical only in co junction with the production of ammonium phospha and still offers technical difficulties. The book giv many references to the literature and patents, a contains author and subject indexes. It is a ve competent and concise survey of the subject with whi it deals.

J. R. P.

CHEMISTRY AND TECHNOLOGY OF CRACKING. By A. Sachanen, D.Sc., and M. D. Tilicheyev. Tra lated by A. A. Boehtlingk, D. F. Brown, and K. Steik. Pp. 389. New York: Chemical Catal Co., 1932. $8.

The authors of this monograph, which has been tran lated from the Russian, realizing that the developme of cracking processes and technique has resulted fro the use of empirical methods rather than from preci

hysical and chemical data, have themselves conducted experiments at the Petroleum Research Institute of the Grozneft in the endeavour to investigate the laws that govern the reactions occurring when petroleum derivatives are subjected to the operation of cracking. Pyrolysis as applied to narrow fractions and to pure compounds has been studied with particular care, and a technique established for testing the behaviour of mineral oil under cracking conditions by investigating their behaviour when successively recycled.

The scope of the monograph can be illustrated by the chief chapter headings: Fundamental features of cracking; cracking crude oil and products of crude oil; chemistry of cracking; chemical composition of cracked compounds; cracked gasoline properties and treatments; cracked kerosene and heavier oil distillates; residue, coke and gases obtained by cracking; principal cracking systems and hydrogenation of petroleum products. The last chapter includes an account of the authors' own research as well as a general account of current work on the subject. The descriptions of large-scale equipment are meagre and could well be amplified. The discussion of the chemistry of the hydrogenation process is thorough and sound and special care has been taken to differentiate between cracking and hydrogenation reactions but the treatment of catalysts could be strengthened.

As in most Russian text books sulphuric acid treatment receives special attention, but surely it is incorrect to state that "sulphuric acid reacts more easily with thiophenes." The occurrence of thiophenes in cracked spirit is not of special importance, and in any case is not so objectionable as mercaptan and the lower alkyl-sulphides. Further to say that "the removal of di-sulphide is a complicated technical problem" is somewhat wide of the truth. Other treating methods are discussed in a somewhat summary manner.

The book is interesting and should prove of real value to chemists in the petroleum industry.

A. E. D.

Gas Analysis by the Measurement of Thermal Conductivity. By H. A. Daynes, D.Sc. Pp. viii + 357. London: Cambridge University Press, 1933. 16s.

Here is the story of a scientific epic. Almost one hundred years ago it was noticed that a wire, heated electrically to incandescence in air, ceased to glow when surrounded by hydrogen. This observation was developed to give a method of determining the conductivity of gases and was used during the War to determine when the hydrogen escaping into the air in balloon and airship sheds reached the explosive limit. After the War the need for fuel economy led to this method being used for the analysis of carbon dioxide in flue gases without the necessity of renewing chemicals and it has been recently employed in the synthetic ammonia process to ensure that the nitrogen-hydrogen mixture passing to the catalyst is in the correct proportions.

Thermal conductivity provides an entirely new basis for the analysis of gases and is very roughly inversely proportional to their molecular weight. Hence nitrogen, oxygen, and carbon monoxide cannot be analysed except by round-about methods. Nitrogen in hydrogen, and carbon dioxide in air, lend themselves readily to accurate determination. More than half of the book is devoted to the scientific basis of the method, the necessary apparatus, and the technique of measurement. The operation of hot wire conductivity bridges is clearly described by a water analogy in the text and mathematically in the appendix. A chapter on the design of resistance bridges for various conditions of research and plant operation is worth reading for its general information. The question of time lag of the conductivity cell does not appear to have received the attention it deserves. In some instruments the gas can only reach the hot wire by diffusion and, although hydrogen diffuses rapidly, gases such as carbon dioxide diffuse much more slowly. In these days of automatic control of chemical processes it is essential to eliminate this lag.

The remainder of the book deals with applications to the analysis of producer and blast furnace gas, liquid air gases, electrolytic hydrogen and oxygen, controlling carbon dioxide in fruit stores, sulphur dioxide from sulphur burners, solvent-laden air in rubber and artificial silk works, and dissolved oxygen in boiler feed water. Typical research applications are to the study of balloon fabric permeability, of exhaust gases from internal combustion engines, and of respiration from plants and animals.

The facts are presented in a logical order, which unfortunately involves a certain amount of repetition. Great care has been taken to make the book a complete exposition of the subject and one to which reference will be widely made.

M. B. Donald

Die künstlichen Kohlen für elektrische Öfen, Elektrolyse und Elektrotechnick. By Prof. K. Arndt. 2nd ed. Pp. vi + 336. Berlin: J. Springer, 1932. 38 rm.

Dr. Arndt is a recognized authority on the subject of this book and was in charge of German electrode production during the Great War. The thirty years which have elapsed since the appearance of Zellner's book have seen enormous increases in the output of carbides, aluminium, and numerous other products of electrolysis and the electric furnace. In spite of the difficulties of manufacture larger carbon electrodes have been in constant demand so that much research has been undertaken and many difficulties overcome. The whole of a very wide subject has been treated successfully in sixteen chapters.

A concise historical introduction is followed by information on raw materials, drying and preliminary treatment. In chapters four to seven various crushing and grinding plants are illustrated and described after which mixing, pressing, and firing are dealt with, the well-known Söderberg electrode receiving very full treatment: chapter seven concludes with the graphite industry.

Chapters eight and nine on the physical testing and chemical examination of electrodes are brief but good, while the tenth chapter on microscopical and photographic examination is excellent.

The application of carbon electrodes to different types of electric furnace is then dealt with and particular attention is given to the manufacture of ferrosilicon, ferrovanadium, phosphorus, and carbon disulphide. Chapters twelve and thirteen are devoted to the use of carbon electrodes in fusion electrolysis and the electrolysis of aqueous solutions respectively. Arc-lamp carbons, cored and otherwise, together with full details of their behaviour, including spectrograms, form the substance of chapter fourteen. The carbon brush industry receives treatment worthy of its importance, the methods of testing by the oscillograph being well illustrated, while the final chapter deals with the manufacture of battery carbons and microphone granules. A striking feature of the book is the wealth of illustrations, of which there are 365, and students in particular should find them very useful, although a few of the photographs of simple plant and machines appear superfluous because they are also illustrated by excellent line diagrams. However, taken as a whole the book is very good and it is excellently bound.

There is a combined name and subject index.

A. M.

Lubricating and Allied Oils: A Handbook for Chemists, Engineers, and Students. By E. A. Evans. Foreword by The Rt. Hon. Lord Wakefield of Hythe, C.B.E., LL.D. 2nd ed., revised and enlarged. Pp. xv + 175. London: Chapman & Hall, Ltd., 1933. 9s. 6d.

The object of this book is to explain to technical chemists and engineers the meanings of the terms they commonly use in discussing lubricants and specifications concerning lubricants; the book should to a great degree achieve its purpose.

The major portion deals with the physical and chemical tests usually employed in analysing lubricating oils and is, generally speaking, quite adequate. One is rather surprised at the disproportionate amount of space which the author occasionally allots to obsolescent methods and to subjects of minor importance. It is difficult to understand, for example, the need for seven pages on the determination of specific heats or for the long lists of specific heats of numerous hydrocarbons.

The prominence given to the modern procedure of recording viscosity in absolute units is to be commended, for all oil chemists look forward to the rapidly approaching day when the arbitrary units of Redwood, Engler, Barbey, and Saybolt will be superseded by the centipoise or centistoke.

The last two chapters are the best in the book, for here the author has the opportunity of utilizing to practical advantage his wide experience. On the choice of suitable lubricants for a particular purpose, Mr. Evans gives help that will prove sound and valuable. In the next edition one would welcome an extension of this section.

A chapter on lubricant testing machines would have been a useful addition to the book. A chapter on cutting oils and other "soluble oils," and a dispassionate review of the advantages and disadvantages of compounding mineral oils with fatty oils would also have been valuable to those for whom this book is intended. The illustrations are good and well reproduced, but the subjects could have been more judiciously selected, for in several cases obsolete apparatus is depicted.

F. B. Thole

Design of a Coal-Gas Induction Burner for a Horizontal Retort Setting. By R. Cook, M.Sc. *Department of Scientific and Industrial Research.* Fuel Research Technical Paper No. 38. Pp. vi + 16. London: H.M. Stationery Office, 1933. 6d.

This paper describes a burner designed in connexion with the general investigation on horizontal retorts being carried out at the Fuel Research Station. It was found that the use of coal-gas alone is attended by two chief drawbacks: preclusion of the optical measurement of combustion chamber temperatures due to flame luminosity, and the deposition of carbon round the gas nostrils.

The difficulties were overcome by using hot flue-gas from the regenerator as a diluent, the proportion of flue gas required being dealt with in the second section of the paper. The third section deals with the theory of the induction burner, and is interesting because most work published previously deals with types of injectors in which the driving fluid is at high pressure, and it was found that the formulæ were not applicable to the low-pressure burner under consideration.

The final design of the burner is described and illustrated and an appendix shows by means of graphs the influence of various factors upon the actual performance of the burner. Whilst the problem concerned a special case, it is pointed out that the results may be of value in the design of induction burners for other conditions.

Arthur Marsden

Chemisch-technische Untersuchungsmethoden. Berl–Lunge. Edited by Dr. E. Berl. Vol. 4, 8th revised and enlarged edition. Pp. xxxiv + 1123. *Berlin: J. Springer, 1933. 84 rm.*

This volume maintains the high standard set by the earlier volumes for general excellence of appearance and binding: clarity, accuracy, and simplicity of the text; copious up-to-date references and the exhaustive treatment of the subjects as far as the conventional classification and grouping of the properties of the various products are concerned. A complete list of contents and a comprehensive index make reference easy. A number of the sectionalized subjects are closely related, so that the single volume has a completeness which should be an attractive and valuable feature to fuel technologists and chemists and to those who desire a thorough summary of German technical methods for the chemical analysis and examination of the crude materials of the gas, tar, and oil industries; of substances used in the purification of their products and of the products themselves.

The book commences with a large section on gas manufacture and ammonia, which includes subsections dealing respectively with the control of furnaces, the detailed analysis and examination of fuel gases and their constituents, the examination of the materials, such as wash oils, used in purification processes, and finally the testing of coal, coke, tar, ammoniacal liquors, and ammonia compounds. Coal tars are discussed in

detail in two separate sections: the larger deals with ordinary bituminous coal tars, and the smaller with tar obtained by the carbonization of brown coal, a subject more particularly of interest in Germany. The description of the technical methods for the examination of mineral oils and petroleum products occupies the most considerable portion of the book. Thus, nearly eight hundred pages are devoted to subjects with which the fuel technologist is commonly and repeatedly concerned. The remainder of the book, some three hundred and fifty pages, is devoted largely to fats and waxes and ethereal oils; relatively small sections deal with cyanogen compounds and inks. Criticism by a British reviewer is naturally directed to the scant treatment accorded to British standard methods and standard specifications. Similarly, some indication of the requirements of British users might profitably have been included. A more careful general editing would have eliminated some of the evident overlapping of sections, thus making room for additional data of this character.

Such criticism, however, in face of the general excellence of the whole production, is somewhat parsimonious, and the reviewer has no hesitation in heartily recommending this publication to British readers who desire an accurate and attractive book of reference, particularly one which contains also an able summary of the less well-known but thoroughly satisfactory methods of chemical analysis of the above-named materials. Numerical data are carefully tabulated, and the text illustrated with over two hundred and fifty diagrams and photographic representations. A. McCulloch

Studi e Ricerche sui Combustibili. By Prof. M. G. Levi. Vol. III (1930—1931). R. Politecnico di Milano. Pp. xii + 390. Roma: Tipografia Editrice Italia, 1932.

This is the third volume of papers recording the investigations on Italian combustibles which have been carried out at the Industrial Chemical Institute of the Royal Polytechnic of Milan, under the direction of Profs. Levi and Padovani, with government aid, during the past ten years of the Fascist regime. Since the work was initiated in 1922 some 65 papers have been published. The present volume covers the years 1930—31 and contains 20 papers averaging about 20 pages each. The field covered is wide and includes all the natural Italian combustibles—natural gas, lignites, bitumens, and oils. The papers deal with economic and technical aspects and with numerous researches on cracking, hydrogenation, utilization of products, and analysis. Several are of more general scientific interest, *e.g.*, those dealing with the analysis of complex gas mixtures, the hydrolysis and utilization of methane, and investigations on carbogenesis. Much valuable work has been done and these volumes form a very useful summary of the results obtained. W. A. D.

Low-Temperature Carbonization; *Narrow Brick* Retorts at the Fuel Research Station. By J. Fraser Shaw. Department of Scientific and Industrial Research. Fuel Research. Technical Paper No. 35. Pp. vi + 14. London: H.M. Stationery Office, 1933. 6d.

The low-temperature carbonization of coal for the production of a supply of liquid fuels and of free burning smokeless solid fuel suitable for domestic purposes, has been one of the main lines of research since the appointment of the Fuel Research Board in 1917. From time to time the progress made has been reported in the Board's publications and the present paper brings up to date the story of the efforts to carry out the low-temperature carbonization of coal in brick retorts.

A preliminary survey of work done with metal retorts is followed by particulars of the construction, heating, and operation of the brick retorts. Brief notes on cost and temperature measurements are given and finally particulars of coals carbonized and yields of products obtained. There are three tables and six figures. The conclusions reached appear to be that a retort has been evolved which is low in capital cost, suitable for use at high temperatures if desired, and is also easy to operate.
Arthur Marsden

Methods of Cellulose Chemistry: Including Methods for the Investigation of the Compound Celluloses. By C. Dorée, M.A., D.Sc. Pp. x + 499. London: Chapman & Hall, Ltd., 1933. 21s.

In practice the word "cellulose" has an ever increasing number of implications: in theory we are no longer so ignorant of its molecular composition or of its micro and macro structure. Progress from the point of view of the chemist necessitates the application of satisfactory methods of analysis and investigation so that it may be said that an account of the last fifty years of cellulose chemistry *is largely one of the specialized methods* which have been evolved, methods which are widely scattered in technical and scientific literature. Dr. Dorée has aimed at collecting a selection of such methods under one cover, giving full working details and the necessary references to the original literature.

The book is divided into three parts covering normal cellulose, the synthetic derivatives of cellulose such as nitrate, xanthate, acetate and the new esters and ethers, and the compound celluloses, such as lignin, the hemicellulose, wood, and the pectins.

The book is essentially practical in nature and the attention of the reader is not diverted by discussions of controversial interpretations of structure; it should prove most useful not only to technologists but also to biochemists working in the field, which indeed is one which is bound to attract them in increasing numbers. The discovery of ascorbutic acid, for example, is likely to direct more attention to the uronic acids; the hemicelluloses are of interest from the point of view of the sugars, other than glucose, which they contain.

A valuable chapter is that on the general examination of plant tissues: the methods here enumerated should in greater part be included in the practical training of every botanist as well as of every biochemist as a means of counteracting the neglect of plant chemistry at the present time.

The book is dedicated appropriately to C. F. Cross, a pioneer in cellulose discovery; it is inevitable that we compare the state of knowledge disclosed in the famous book of Cross with that which Dorée unfolds to us. Progress has been great in every direction, employment for thousands and fortunes for not a few have resulted from the application of the discoveries, yet much more remains to be done. E. F. A.

TECHNOLOGY OF CELLULOSE ETHERS. By E. C. Worden, M.A., D.Sc. Vol. I. HISTORICAL DEVELOPMENT OF THE CELLULOSE ETHERS. Pp. cxiii + 306. Vol. II. HISTORICAL DEVELOPMENT OF THE CELLULOSE ESTERS. Pp. cxiii + 307—1100. Vol. III. CELLULOSE ETHERS, RAW MATERIALS AND MANUFACTURE. Pp. cxiii + 1101—1769. Vol. IV. CELLULOSE ETHER SOLVENTS AND COMMERCIAL APPLICATIONS. Pp. cxiii + 1770—2664. Vol. V. INDICES OF PATENTS, NAMES, AND SUBJECTS. Pp. 2665—3396. New York: Chemical Catalog Co. $15.00. Sole Selling Agents in the U.K.: E. & F. N. Spon, Ltd., London, 1933. £13 10s.

These impressive volumes are a further instalment of the author's plan of covering the whole of the chemical technology of cellulose exhaustively. The period covered begins with 1912, when cellulose ethers are first mentioned in the scientific and patent literature, and ends with 1931. The reviewer approaches these volumes with amazement: the mere names of the scientific journals consulted in the compilation of the work cover almost 100 pages, the indices contain more than 100,000 entries, there are about 52,000 patent and literature citations, the patents alone number, apparently, 39,281, and about 2500 solvents, plasticizers, and softeners are enumerated. All this emerges as the result of scientific and technological endeavour in but a small field of investigation, during just less than about twenty years. It is still more amazing that probably no use has ever been made of any one of these cellulose ethers.

Why have they not yet attained industrial eminence? It is very difficult to answer this question shortly and simply: they are probably more difficult to make industrially than cellulose esters; etherifying agents have been hitherto too expensive; the problems of plasticizers, softeners, and solvents are very complex. If an etherifying agent at £10 a ton were available, if a single solvent as effective as acetone is for cellulose acetate, and if a plasticizer as effective as camphor is for nitrocellulose were available, the reign of cellulose ethers would arrive: briefly, that is what is widely believed to be the answer.

It is to be hoped that the recording in these volumes of presumably all that has been done and all that is known may promote the solving of these and other outstanding problems, as doubtless it may. To the reader who consults so massive a record, however, there is always the great difficulty of discriminating between what is best, what may be good, or what is valueless, and progress is not for him until he has first done that. The author manifestly cannot sift the material; he has obviously achieved all that can be expected of him in assembling it.

To come then to a brief survey of the contents of these volumes: Vol. I (306 pages) gives a readable narrative history of the cellulose ethers. Extensive extracts are included from all major patents, and there are lists of claims taken from a great many more. Vol. II (794 pages) gives a chronological record of advances in cellulose ester processes, typified by acetates, as a background of comparison with analogous advances in cellulose ether processes. Vol. III (669 pages) deals with the raw materials for preparing the ethers and ether-esters of cellulose, starch, and other carbohydrates, and the commercial aspects thereof. Vol. IV (894 pages) deals with solvents, softeners, plasticizers, and their uses with cellulose ethers in the preparation of filaments, films, lacquers, and plastics. Vol. V (731 pages) contains the indices of patents, authors, and subjects.

It is obvious that this is an indispensable work of reference, which, for the present, does for the few what Beilstein does for the many—who are not at present concerned, but who may be if and when cellulose ethers become industrially important, as so many are predicting.

TECHNOLOGIE DER TEXTILFASERN. Edited by Dr. R. O. Herzog. Vol. VII. Kunstseide. Revised by E. A. Anke and others. 2nd revised edition. Pp. ix+321. Berlin: J. Springer, 1933. 31.50 rm.

The first edition of this monograph, published in 1927, was the earliest issued volume of Dr. Herzog's admirable series, and it contained advisedly some topics that are now included more appropriately in some of the other volumes since issued. Thus the chemistry and physics of cellulose have been made the subject of a separate volume from the authoritative pen of Dr. Mark, and are now omitted. The book is, in fact, largely new, and most of the chapters are written by new collaborators.

The first portion of the book now deals with the viscose process, and it includes an adequate and unlaboured discussion of topics of outstanding interest during the last five years or so. Thus high alpha pulps, the blending of pulps, the relative merits of high viscosity pulps, the Lilienfeld process, and so on, are all discussed in well-balanced terms, so as to present a picture that enables the reader to visualize the actual problems that have recently been before the industry. The basic principles of the industry have evidently undergone no important change for a long time, and they appear to be permanent. In details, however, it remains true that no two mills are identical, and hence it will also continue to be true that raw materials, pulp in particular, must be selected in relation to the mill conditions in which they will be processed.

The book next deals with the cuprammonium and nitro processes; the former has held its own, and the latter has probably declined in importance. The next portion of the book, dealing with the acetate process, is the one in which most new matter is probably to be found. The success of this particular process has depended in unusual degree upon successful recovery of reagents, about which until recently little was known outside the industry. In this book the topic is well discussed, and there is a separate chapter by Dr. Suida on his very successful process for the recovery of acetic acid. The remaining portions of the book, as in the first edition, deal with finishing, weaving, dyeing, and so on, and the organization of the industry.

A matter of interest and importance recurrently discussed is the evolution of procedure correlated with market demands. There are abundant reasons for concentrating production in few and large units: increased production is then met, largely by intensive throughput, and that is attained by ever-increasing

shortening of the successive stages. In the viscose process the periods of ageing and maturing have been considerably shortened and pulp producers have had to modify their pulps accordingly; in the acetate process spinning has reached very high speeds.

This speeding up of throughput has increased the technical perfection of the products and it is now true that deniers much finer than the market demands could be quite easily produced.

PAPER: ITS HISTORY, SOURCES, AND MANUFACTURE. By H. A. Maddox. 4th ed. Pitman's Common Commodities and Industries. Pp. viii + 172. London: Sir Isaac Pitman & Sons, Ltd., 1933. 3s.

The printing of a fourth impression of this little handbook is a sufficient indication of its popularity and service as a brief introduction to the papermaking industry. The history, raw materials, manufacturing processes, uses, and examination of paper are dealt with in a clear concise manner, and a considerable amount of useful information is compressed into a small space. It serves a double purpose, first, in providing the student entering the industry with a readable elementary primer, a good introduction to larger textbooks, and second, in giving the paper buyer and consumer an intelligent grasp of papermaking, without going too deeply into details and technicalities.

The chapters on the history of paper manufacture, the evolution of papermaking, hand-made paper and the various finishes imparted to paper are the best in the book. A future edition would be considerably improved by a better choice of illustrations, correction of some slight technical errors, and a more up-to-date description of the structure of cellulose. The plant illustrated in Figs. 13 and 15 no longer exists in the modern mill, and the testing apparatus in Figs. 25 and 26 is not typical of the modern laboratory. The machine wire (page 104) does not usually slope downwards toward the suction boxes. This applies only to high-speed machines, and in the majority of cases the wire is either perfectly level or has a slight rise to the boxes. Straw (page 55) does not take the place of esparto on the Continent, but is used for entirely different varieties of paper. Cellulose (page 16) is not amorphous, and both the chemist and physicist have given us to-day a much more definite picture of its constitntion and structure.

JAMES STRACHAN

TECHNICAL SECTION PROCEEDINGS OF THE PAPER MAKERS' ASSOCIATION OF GREAT BRITAIN AND IRELAND, 1933. Vol. XIII. Part 2. Pp. v + 304—469. London: Paper Makers' Association of Great Britain and Ireland, 1933. 10s. 6d.

Technologists in the British paper industry continue to give evidence in this, the latest volume of their Proceedings, of the application of scientific method to practical paper problems. This volume includes papers read and discussed in London, Manchester, Edinburgh, and Taunton.

The chemical side of papermaking is represented by a symposium on "Rosin Sizing" (introduced by Dr. Harrison) in which the chemical, physical, and colloidal aspects of this interesting subject are discussed by a number of mill chemists.

Laboratory methods include a paper on "The Blancometer and Its Uses," by S. R. H. Edge, and an interesting paper on "The Rigidity of Boxboard," by S. F. Smith, the latter being a particularly useful contribution to practical paper testing. The engineering aspect of papermaking is found in S. Bury's paper on "Industrial Safety" and in the more practical paper on the "Remodelling of Industrial Steam-Raising Plants," by B. W. Bagshawe, describing how the highest degree of efficiency may be obtained from Lancashire boiler installations. A practical papermaker, S. D. McNeill, contributes a paper on "The Formation of Paper on the Fourdrinier Wire," in which he attempts to reduce this subject to a scientific basis by consideration of all the mechanical and physical factors involved in forming a sheet of paper from a suspension of the fibres in water.

A practical printer, T. S. Foweraker, tells the papermaker "What the Colour Printer Expects from the Papermaker," dealing with the physical properties from the lithographic printer's point of view.

The ground covered by these papers, and the discussions on same indicate clearly a growing amount of co-operation between chemist, engineer, and the practical man in the papermaking industry.

JAMES STRACHAN

CHEMISTRY AND PHYSICS OF CLAYS AND OTHER CERAMIC MATERIALS. By A. B. Searle. 2nd ed. Pp. xvi + 738. London: E. Benn, Ltd., 1933. 55s.

It is no easy task to read a technical book containing more than 700 pages; in doing so the reader should either learn a great deal about the subject or alternatively he should be convinced that the book is so full of useful information that it must be kept at hand for reference. Unfortunately the reviewer must confess that he was left somewhat puzzled by this collection of abstracts, elementary, advanced, and even highly speculative physics and chemistry. The author appears to have fallen between two stools by attempting to write for the beginner and the expert in one and the same volume. Indeed, it is stated that the book was compiled in order to be "helpful to the chemist, the physicist, and the practical clay worker . . . the student and the manufacturer." The book is however, so devoid of useful referenees, and the summaries of published matter are so inadequate and misleading that the book is of little use to the expert or to the advanced or research worker in the sphere of ceramics. Such statements as "Glasshouse pots and tank blocks should have a porous structure internally" (p. 97); "Fireclay bricks in which a large proportion of the clay has previously been converted into artificial sillimanite . . ." (p. 205); "The dielectric strength . . . is expressed by the number of volts per mil . . . which must be passed at 250° C. before a current will flow" (p. 671), reveal either an inadequate conception of the problems or failure to distinguish between sound and inaccurate technical data.

Manufacturers may judge the book from two statements: "Silica bricks should usually be made from rocks containing at least 97 per cent. of silica. . . . If the impurity in silica rocks is in the form of clay, a silica percentage of only 90 may not be harmful" (p. 440). ". . . difference between true and apparent specific gravities of silica bricks is about 0·011 per cent." (p. 233).

The volume requires very careful revision if it is to become a satisfactory textbook or treatise, because the generally accepted broad principles and the better experimental methods are not emphasized sufficiently. The student may also acquire wrong notions from such statements as: "Satisfactory crystalline structures have almost negligible coefficients of expansion" (p. 25); "Articles . . . of tridymite are constant in volume when heated" (p. 471); "Cristobalite is not a desirable constituent of silica bricks because it tends to be converted into quartz at a low temperature (below 200° C.)" (p. 471). What would the student think of the description of the method of determining electrical resistance given on page 685?

In its present form the volume will be a disappointment to those who are familiar with the author's "Refractory Materials." J. H. PARTRIDGE

Chemistry of Drugs. By N. Evers, B.Sc., F.I.C. 2nd ed., entirely revised and enlarged. Pp. viii + 256. London: E. Benn, Ltd., 1933. 55s.

This book gives a brief account of the constitution and properties of those drugs which can be described as organic chemicals, together with descriptions of the methods of manufacture of such as are synthetic in origin, and of the mode of isolation of the more important natural compounds. The synthetic drugs are classified according to their uses as hypnotics, antipyretics, and so on, whilst the natural drugs are arranged according to their chemical properties, as alkaloids, glucosides, etc.

In the second edition now published, the author has not only brought his matter right up to date, but has also made some useful re-arrangements. Since the publication of the first edition in 1926, very considerable progress has been made in biochemical science, and now in place of a chapter on "Drugs of Animal Origin," proceeding through cantharidin and cod-liver oil to various hormones, there are separate and excellent chapters summarizing the chemistry of the vitamins and hormones, whilst miscellaneous drugs of animal origin are discussed in appropriate sections.

Apart from biochemical developments, the marked progress made in our knowledge of drugs since 1926 is reflected in this volume by descriptions of new synthetic drugs, such as sulpharsphenamine, plasmoquine, and hexyl resorcinol; of new natural principles, such as ephedrine; and by synopses of recent work on the constitution of important natural principles, such as thyroxine, emetine, and strychnine. A new section on skiagraphic chemicals has been introduced, but is mainly concerned with tetraiodo-phenolphthalein. It might well be extended to include other iodine compounds, such as iodized oils, and derivatives of bismuth and barium (even though inorganic), with reference to the organs which they enable to be visualized.

The statement that "the structure of pilocarpine has been elucidated by Jowett and later by Pyman" is out of proportion; the structure of this alkaloid was elucidated in the main by the independent investigations of Jowett and Pinner, and the reviewer's contribution to the subject only determined the choice between alternative formulæ. The suggestion that the relation between pilocarpine and *iso*-pilocarpine is in doubt is somewhat over-cautious, for few chemists who are well acquainted with the subject can doubt that the two alkaloids are stereoisomeric. On the whole, the selection of material is extraordinarily well balanced, but it might be suggested that in future editions a little more weight should be given to sources of vitamin-*A*, such as mammalian-liver and halibut-liver oil, and also to organic salts of bismuth, such as quinine bismuth iodide, and some of the oil-soluble bismuth salts of recent introduction, which are quite as important as some of the compounds of mercury, silver, or gold described.

The new edition of this valuable publication has been improved greatly in format, and may be recommended cordially to all who desire a summary of the present state of our knowledge of the chemistry of organic drugs. F. L. PYMAN

SCIENCE AND PRACTICE OF PHARMACY. By R. R. Bennett, B.Sc., F.I.C., and T. Tusting Cocking, F.I.C. Vol. I. Pp. viii + 385. London: J. & A. Churchill, 1933. 18s.

The first volume deals in ordered sequence with the processes and apparatus used in carrying out various pharmaceutical operations and gives some explanation of the principles involved. As the ground that is covered is both varied and wide, the subject-matter is for convenience of presentation divided into three parts. Part 1, consisting of 210 pages, starts with an exposition of the weights and measures as used in pharmaceutical operations, and proceeds to deal with the naturally occurring drugs and their preparation in a form suitable for use in the production of galenicals. It describes the basic processes used in pharmaceutical manufacture and gives in some detail particulars of suitable apparatus for carrying out either small or large-scale operations. Part 2 occupies 114 pages and deals with the preparation of the official galenicals, and, in addition to giving a précis of the pharmacopœal processes for the production of individual galenical preparations, describes the general methods used in the preparations of different classes of medicaments. Part 3, of 46 pages, is devoted to an account of the principles of the sterilization of materials used in medicine, surgery, and pharmacy, and to the preparation of medicaments for parental administration.

The authors have produced a textbook which is a valuable commentary on the British Pharmacopœia and which adequately deals with the subjects named in the sub-title. In the portions dealing with official preparations they keep very closely to the particulars given in the official monographs, and, as becomes a book which will inevitably be mainly used as a textbook for students, there is evidence that great attention has been paid to the accuracy of the information given. The type of aside which appears at infrequent intervals and is exemplified in the paragraph on Glycerinum Phenolis, p. 264, is both interesting and informative and gives a touch which is of distinct practical value. In the main the illustrations and diagrams are well produced and serve their purpose well, but as a minor comment it might be pointed out that wording on some of the diagrams has, owing to reduction during reproduction, become almost indecipherable. The type used is clear and easy to read, and the indexing is distinctly good.

B. A. BULL

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Explosives for 1932. Home Office. (9d.) Building Science Abstracts. Vol. VI. Nos. 3, 4, 5, 6, 7. (1s. 6d. each.) Dry Rot in Wood. Forest Products Research Bulletin No. 1. (1s.) Practical Kiln-Drying. Forest Products Research Report No. 3. (1s. 6d.) Concrete in Road Construction. (12s. 6d.) The Reduction of Noise in Buildings. Building Research Bulletin No. 14. (D.S.I.R.) (9d.) Engineering Research. Deterioration of Structures in Sea-Water. 13th (interim) Report of Committee of Institution of Civil Engineers. (D.S.I.R.) (1s. 6d.) The Mineral Industry of the British Empire and Foreign Countries: Lead. (2nd ed.) (4s.) Output and Employment at Metalliferous Mines, Quarries, etc., Quarter ended March 31, 1933. (6d.) Safety in Mines. Report of Investigation of Safety of Mining Telephones of Magneto Ring Type. (6d.) The Northumberland and Durham Coalfield, Durham Area. The Hutton Seam. Survey of National Coal Resources, No. 27. (2s. 6d.) *Reports of H.M. Inspectors of Mines for 1932:* No. 1. Scotland. No. 2. Northern. No. 3. Yorkshire. No. 4. North Midland. No. 5. North Western. No. 6. Cardiff and Forest of Dean. No. 7. Swansea. No. 8. Midland and Southern Division. (1s. each.) Pulverized Fuel—The "Grid" Burner. Fuel Research Technical Paper, No. 36. (6d.) Fuel Research. Quantitative Analysis of Coal and Ash. Survey of Coal Resources No. 28. (6d.) *Design of Coal Gas Burner for a Horizontal Retort Setting.* Fuel Research Technical Paper No. 38. (6d.) The Use of Chains and other Lifting Gear. Home Office Safety Pamphlet No. 3. (6th ed.) (9d.) Return Relating to All Authorized Gas Undertakings—1932. (4s.) Electric Signalling Systems and Telephones in Mines. Safety Pamphlet No. 8. Mines Department (3d.) Report of H.M. Electrical Inspector of Mines for 1932. (1s.) Fibres: A Summary of Figures of Production and Trade. Empire Marketing Board. (6d.) Industrial Accidents. Abstracts from Reports of Industrial Accidents. Vol. I. No. 1. (3d.) National Physical Laboratory. Collected Researches Vol. XXIV. Paper V. An International Comparison of Temperature Scales between 660° C. and 1063° C. (6d.) Industrial Lighting. Pt. I.—Docks, Warehouses, and their Approaches. Illumination Research Technical Paper No. 14. (9d.) Factory and Workshop Orders, 1933 Edition. Home Office. (4s.) The Purification of Waste Waters from Beet-Sugar Factories. Water Pollution Research Technical Paper No. 3. (7s. 6d.) Water Pollution Research. Summary of Current Literature. Vol. VI. Nos. 5, 6, 7, 8. (2s. each.)

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Analysis of Oil for the Production of Lubricants. By A. A. Ashworth. (9s.) The Chemistry and Physics of Clays and Other Ceramic Materials. By A. B. Searle. (55s.)

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Longmans, Green & Co., Ltd.

Steel-Makers. By H. Brearley. (Probably 5s. Ready shortly.) A Comprehensive Treatise on Inorganic and Theoretical Chemistry. Vol. XIII. Fe (Pt. II.) By J. W. Mellor. (Probably 63s. Ready November.) Organic and Biochemistry. By R. H. A. Plimmer. New ed. (21s.) Introduction to Physical Chemistry. By A. Findley. (7s. 6d.) An Introduction to Physical Chemistry. By F. B. Finter. New ed. (6s.) Introduction to Internal-Combustion Engineering. By J-B. O. Sneeden. (6s.)

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The Alloys of Iron and Silicon. By E. S. Greiner, J. S. Marsh, and B. Stoughton. (30s.) Air Conditioning. By J. A. Moyer and R. U. Fittz. (24s.)

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Theoretical Physics. Vol. II. By W. Wilson. (18s.) Modern Thermodynamics by the Methods of Willard Gibbs. by E. A. Guggenheim. (10s. 6d.) Collision Processes in Gases. By F. L. Arnot. (3s.) Physical Constants. By W. H. J. Childs. (2s. 6d.) The Adsorption of Gases by Solids. By S. J. Gregg. (In preparation.) Food and Character. By L. Berman. (8s. 6d.)

Mr. J. Murray

General Science. By H. G Mitchell. (Two parts, 2s. each, or complete, 3s. 6d.) A Beginner's Chemistry. By C. M. Jones. (2s.) Handbook of Physiology. By W. D. Halliburton and R. J. S. McDowall. (33rd ed.) (18s.)

Sir Isaac Pitman & Sons, Ltd.

Principles of Electric Welding. By R. C. Stockton. (7s. 6d.) Technical Thermodynamics. Translated from W. Schüle's Technische Thermodynamik by E. W. Geyer. (Ready shortly. About 40s.)

George Routledge & Sons, Ltd.

The Sorption of Gases and Vapours by Solids. By J. W. McBain. (25s.)

THE ASSOCIATION OF BRITISH CHEMICAL MANUFACTURERS

NOTES FROM THE SEVENTEENTH ANNUAL REPORT FOR THE YEAR ENDING MAY 31, 1933

Membership

Two new Members joined the Association and three firms resigned during the year, while the internal reorganization of a large firm resulted in the disappearance of three of its subsidiaries who were individual Members of the Association. The membership at the end of the year has thus decreased by four, giving a net total of 105. The number of affiliated associations has increased by one by the accession of the Federation of Bone Users and Allied Trades, Ltd., and is now 12.

Officers

There has been no change since last year in the officers of the Association, who have been as follows: *President:* Mr. C. A. Hill, B.Sc.; *Vice-Presidents:* Dr. Charles Carpenter, C.B.E., D.Sc.; Dr. G. C. Clayton, C.B.E., M.P. (now Sir Christopher Clayton); Mr. R. G. Perry, C.B.E.; *Chairman:* Dr. E. F. Armstrong, D.Sc., F.R.S.; *Vice-Chairman:* Mr. D. Lloyd Howard, J.P.; *Hon. Treasurer:* Mr. E. V. Evans, O.B.E.

In the past the normal period of office for the Chairman of Council has been two years, but in view of the special circumstances arising out of the Ottawa Conference, the Council were of the unanimous opinion that it was highly desirable that Dr. Armstrong should serve for a third year and this he consented to do.

Council

The constitution of the Council during the year has been as follows: *Elected Members:* Dr. E. F. Armstrong, Mr. F. W. Bain, Mr. H. Ballantyne, Dr. F. H. Carr, Dr. G. C. Clayton (now Sir Christopher Clayton), Mr. E. V. Evans, Mr. C. A. Hill, Mr. N. N. Holden, Mr. D. Lloyd Howard, Dr. P. C. C. Isherwood, Mr. C. F. Merriam, Mr. R. G. Perry, Mr. F. M. Roberts, Mr. E. Wallace, Mr. K. H. Wilson, Mr. W. J. U. Woolcock.

Co-opted Members: Mr. R. Duncalfe, Sir David Milne Watson, Lord Trent, Mr. A. C. Wilson.

Hon. Members: Sir Harold Boulton, Bart., Sir Robert L. Mond, Dr. M. O. Forster (now Sir Martin Forster), Sir Harry McGowan, Sir Max Muspratt, Bart.

Exhibitions

At the British Industries Fair, 1933, the Chemical Section was moved to a more prominent position towards the front of the Main Hall at Olympia, which, in the opinion of exhibitors, was an improvement. The standard of the display continues to improve and t Section attracted favourable comment by overs visitors in comparison with foreign exhibitions. T Section, however, is steadily decreasing in size, and t Council has expressed the opinion that it is most i portant that it should worthily represent the chemi industry and help to keep before the Governme and the public the claims of this key industry. T industry can only expect legislative support provid that Parliament and public understand what it is doi

Legislation

During the year the main item of legislation fr the point of view of the chemical industry has been t Pharmacy and Poisons Bill. This Bill, which h previously been before Parliament but had been dropp was reintroduced in modified form early in the ye The Association and its affiliated Associations pa ticularly concerned, namely the British Disinfecta Manufacturers' Association and the Association of Briti Insecticide Manufacturers, were in agreement with t general principles of the Bill, but they felt that t manufacturing interests should be represented on t Poisons Board which was to be set up under the Act advise the Home Office in its administration. Acti representations were made to the Government, as result of which arrangements were secured which, in t opinion of the three Associations concerned, adequate safeguarded the manufacturing interests. These a rangements involved an amendment to the Bill and undertaking in regard to administrative procedure whi ensured that the Associations in question would be co sulted by the Poisons Board and would have full oppo tunity of expressing their views to the Secretary of Sta before any Orders or Regulations affecting industry we issued. The Bill has now become law.

Import Duties Act, 1932

(*a*) *Additional duties.*—Between June 1, 1932, a the end of August, 1933, additional duties have be imposed on the following items in which the Associatio is interested, namely, linseed oil; yeast; decolorizi and activated carbons, other than those of anim origin; glue, size, gelatine, and osseine; lactose; alu and sulphate and hydrate of alumina (increased add tional duty), while a revised description, negotiated b the Association in conjunction with the Paint Federatio has been issued for Class III, Group X, Section 2 relating to paints, enamels, lacquers, varnishes, et in the Additional Duties (No. 1) Order, 1932. Redu tions in the additional duties have been made on acet acid, tartaric acid, acetone, formaldehyde, and nit acid in view of the Commercial Treaties negotiat with Germany and Norway to which further referen is made later. In the case of salt and calcined magnesi the Import Duties Advisory Committee has made recommendation for additional duties.

(*b*) *Free list.*—Between June 1, 1933, and the end August of this year, the following products have be added to the free list under the Import Duties A in most cases as the result of the Association's repr sentations, namely, bromine; crude boron mineral eight important natural essential oils; glycol ethe and ether esters; white arsenic; ipecacuanha roo

crude araroba; pyrethrum flowers; coca leaves; iron bromide; bismuth metal; crude copper iodide, and tin metal. Calcium carbide, calcium cynanamide, and nitrate of lime have also been added as a result of the Commercial Treaty with Norway. In the case of crude iodine and borneol the Committee could not make a recommendation for free import.

COMMERCIAL TREATIES WITH FOREIGN COUNTRIES

When the Import Duties Act was passed, the Government indicated that it was not prepared to enter into discussions with foreign countries for negotiation of new commercial treaties until the Ottawa Conference was over. Immediately after Ottawa, numerous requests were received. The Association was of opinion that the importance of the British market should be used to the full extent to obtain preferences from the negotiating countries without making concessions on our own part, and that we should not be content with most favoured nation agreements extending to all and sundry. The Government did not accept this view but stated that they were not prepared to put forward requests for special British preferences since this would be contrary to the most favoured nation obligations in most of the existing commercial treaties. In other words they were not prepared to negotiate new treaties on other than most favoured nation conditions. This meant that in submitting proposals for the reduction or modification of a foreign tariff, we had to face the fact that any concession granted would apply to all other countries. With this restriction it was found that the concessions, which would be of more value to our chemical trade than to that of other countries, were very few indeed.

The points of special interest to the chemical industry in the new treaties which have so far been concluded are as follows:

(a) *Germany.*—The exchange of notes which gave an increased quota to British coal and coke reduced the British protective duties on, *inter alia*, acetic acid, acetone, tartaric acid, and formaldehyde.

(b) *Denmark.*—The treaty stabilized and limited the duties that could be imposed in regard to a few chemicals in which one or other country was interested. The main feature was the adoption for the first time of a system of commercial agreements between producing and buying organizations, whereby the Danish purchasing organization undertook to buy certain agreed quantities of a particular product, for example, salt and saltpetre, during the period of the treaty. This method appears to surmount most favoured nation objections, and has been applied with success, as far as chemicals are concerned, in the Finnish negotiations.

(c) *Argentina.*—There are no chemical items in the Agreement so far published and the supplementary Agreement regarding duties on specific products due in August must be awaited.

(d) *Norway.*—The United Kingdom has secured continued free entry for a few important chemicals in return for a number of free list and reduced duty concessions, and the stabilization of duties on other products.

(e) *Sweden.*—The position is similar to that for Norway.

(f) *Iceland.*—There are no items of chemical interest.

To sum up, these treaties, apart from the purchasing agreements in the case of Denmark, do not improve the conditions for our chemical trade with the countries in question. The German treaty will in fact result in greater imports into this country. It is doubtful whether the chemical industry has not lost rather than gained by these treaties.

Through the Russian Committee of the Federation of British Industries, the Association has expressed its views in regard to the conditions to be secured in the negotiation of a new trade treaty with Russia, and has also been able to supply Members interested with reliable sources of information on Russian conditions.

PATENTS

In view of the leading part which the Joint Chemical Patents Committee had taken in connexion with the Patents and Designs Act, 1932, in its passage through Parliament, an opportunity was given the Committee of considering the new Patent Office rules necessitated by the Act. Various criticisms and suggestions for amendments were made and the final rules, as issued, contain practically all the Committee's suggestions, and certain wording to which particular objection had been taken was modified.

As was anticipated in the last Report, the Board of Trade convened in the autumn a conference of all the parties interested in medical patents with a view to seeing how far it was possible to reach agreement. After a frank exchange of views from which the points of divergence become clear, the chemical representatives, while opposing the total abolition of medical patents, agreed to consider a proposal to abolish patents in the restricted field of patents for methods of preparing biological substances such as serums, toxins, antigens, and viruses, and a Joint Sub-Committee was appointed to explore the possibility of agreement on these lines. The Sub-Committee has met and drafted a memorandum, setting forth the reasons in favour of the abolition of patents in this field and this is now awaiting consideration by the respective main Committees.

The consideration of the medical patents problem has been much facilitated by a memorandum prepared for the Patents Committee by Mr. C. Hollins of Imperial Chemical Industries, Ltd., setting out in simple language the present state of the law in regard to medical patents with particular reference to what was and was not patentable. The medical interests have expressed their keen appreciation of this lucid explanation of the position.

TAR INDUSTRY

Early in the year the consumers of phenol, both within this Association and the Plastics Association, became alarmed as to a possible shortage of this important raw material. After a careful investigation of the whole position, it was clear that if there were a real shortage, about which there were doubts in certain quarters, the only possible solution which would help the consumer would be to exempt synthetic phenol temporarily from key industry duty under the Safeguarding of Industries Act so that it could be imported from abroad. The effect on benzole of the hydrocarbon oil duty put out of court any question of synthetic manufacture in this country. After hearing all the arguments, the Board of Trade was satisfied that there was a definite shortage, and consequently granted

temporary exemption for synthetic phenol until December 31, 1933. Synthetic phenol will thus pay 10% only under the Import Duties Act. Imports will have to be licensed under the Dyestuffs Act so that in this way it will be possible to restrict imports so long as home supplies of the natural product are available.

Fine Chemical Industry

It is gratifying to report that three important fine chemicals, for which in the past temporary exemption has been granted from key industry duty, are now being manufactured in this country, namely, phenacetin, resorcinol, and hydroquinone. The key industry duty was consequently reimposed on these products from the beginning of this year.

Dyestuffs Industry

The Dyestuffs Industry Development Committee was asked last year to review the situation of the dyestuffs industry and the Dyestuffs Act since its report in 1930. It was unable to present a unanimous document. The majority report, which was signed by all the Committee except the two representatives of the colour users, recommended that the Dyestuffs (Import Regulation) Act be continued on its present basis for a period of three years: two of the independent members, however, stipulated that the period should be five years. The minority report urged the discontinuance of the Act. The Government decided to continue the Act for a further year, during which period the Import Duties Advisory Committee would make an inquiry into the whole position and advise as to how the general interest could best be served. The Committee has now made its investigation, in the course of which it obtained the observations of the organizations concerned and gave their representatives an opportunity of putting forward their views in person. The Association urged that the Dyestuffs Act should become part of the permanent legislation of the country.

Miscellaneous

The Association has maintained contact with the various bodies mentioned in the last Report and in particular has taken an active part in the work of all Committees of the Federation of British Industries likely to be of interest to the chemical industry. It has continued its regular services such as the Safety Summary and Circulars, its monthly Summary of Chemical Trade, and the monthly distribution of detailed import data on fine chemicals and on the various products subject to additional duties. It has dealt with a very large number of inquiries of all kinds both from members and non-members, and in particular has provided much information to foreign individuals and organizations interested in the purchase of British chemicals.

At the annual meeting which was held on Thursday, October 12, the following officers were elected: *President:* Sir Christopher Clayton; *Vice-Presidents:* Dr. E. F. Armstrong, Sir Charles Carpenter, Mr. C. A. Hill, Sir Max Muspratt, Mr. R. G. Perry, and Sir David Milne Watson; *Chairman:* Dr. F. H. Carr; *Vice-Chairman:* Mr. E. Wallace; *Hon. Treasurer:* Mr. E. V. Evans.

SOCIETY OF CHEMICAL INDUSTRY

OFFICIAL NOTICES

Members are reminded of the following three events in the Society's programme:

Road Materials Conference. This conference will be held under the auspices of the Society on November 14 in connexion with the Public Works, Roads, and Transport Congress. Application for tickets should be made to the General Secretary.

Food Symposium. November 23 and 24.

Annual Chemical Dinner. The Annual Chemical Dinner is to be held in the Hotel Great Central on Tuesday, November 28. Application forms are now available and will be circulated in due course. If members wish, copies may be obtained from the General Secretary.

BRISTOL SECTION

The opening meeting of the Bristol Section of the Society was held on October 19 in the chemistry department of Bristol University, with Dr. R. D. Littlefield in the chair. The speaker was Dr. J. T. Dunn, President of the Society, his subject being "Some Random Thoughts on our Society." Dr. Dunn indicated the functions of the Society in affording opportunities for meetings and discussions and in publishing a journal which contained the original matter read at meetings and abstracts of work in industrial chemistry all over the world. He pointed out the advantages of local sections in the chief industrial centres, as well as the subject groups such as the Chemical Engineering Group, the Food Group, and the Plastics Group, which were now working very successfully. He urged members to attend annual and sectional meetings, to take an interest in the government of the Society, and to endeavour to increase the membership.

MONTREAL SECTION

The first meeting of the Montreal Section of the Society was held in the Windsor Hotel on October 4, and was preceded by the usual dinner. Seventy members attended the dinner and there were more than a hundred at the meeting, at which Mr. R. A. Witherspoon acted as chairman. The meeting recorded its deep regret at the recent death of Mr. H. P. Foran, who was at one time secretary of the Montreal Section and afterwards general secretary for the whole of Canada, and a letter of sympathy was sent to Mrs. Foran.

It was decided to hold a dinner for Dr. A. E. Dunstan, vice-president of the Society, on October 11. After other business had been concluded a paper was read by Mr. Jerome B. Bell on "Alfred Nobel's Inventive Genius in its Relation to the Explosives Industry." The paper will be published in the Journal at a later date. Two films were then shown, by the courtesy of Canadian Industries, Ltd., dealing with the uses of dynamite.

SOUTH WALES SECTION

The opening meeting of the South Wales Sections of the Society of Chemical Industry and the Institute of Chemistry was held at Thomas' Café, Swansea, on

Friday, October 20, when a lecture on "The Tundishing of Shell Steel" was given by Mr. E. M. Wedlake. The chair was taken by Mr. C. M. W. Grieb, B.Sc., F.I.C., chairman of the local section of the Society of Chemical Industry.

The lecturer mentioned that in 1916 South Wales steel makers were called upon to provide shell steel for the French guns and gave an interesting account of the difficulties encountered during the manufacture of this product which was new to South Wales makers. He described the method of "Tundishing" practised at the various works and the benefit that accrued from close observation during the "teeming" process which eventually led to the successful manufacture of this steel, which formed an important contribution by South Wales during the shortage of munitions which was acute at that period.

A discussion followed in which the chairman, Prof. J. E. Coates, Messrs. J. H. Wells, George Madel, and others took part. After Mr. Wedlake had replied, a cordial vote of thanks was accorded him.

CHEMICAL SOCIETY

At an ordinary scientific meeting held in the lecture room of the Royal Institution on October 19 the President, Prof. G. T. Morgan, O.B.E., F.R.S., announced that the following have been proposed by the Council as Honorary Fellows of the Society, and that a ballot for their election will be held on November 2: Prof. Auguste Béhal (Paris), Prof. E. C. Franklin (Stanford, California), Sir Frederick G. Hopkins, Pres. R.S. (Cambridge), Prof. Camille Matignon (Paris), Sir Prafulla Chandra Rây (Calcutta), Prof. F. A. H. Schreinemakers (Leyden), Prof. Dr. Adolf Windaus (Göttingen).

Prof. W. A. Bone, F.R.S., delivered an experimental lecture entitled "The Combustion of Hydrocarbons."

Proposing a motion for a vote of thanks to the lecturer and his assistants, Prof. H. E. Armstrong, F.R.S. agreed that the process of oxidation is one of hydroxylation, but he still postulated the intermediate formation of hydrogen peroxide, whether or not its presence can be detected. The lecture had dealt with some of the fundamental things of chemistry.

Prof. A. Smithells, C.M.G., F.R.S., seconding, said that he had always regarded the study of combustion as the central problem of inorganic chemistry. He described the lecturer's work as an admirable exhibition of chemical craftsmanship, and uttered a warning against excessive theorising on slender experimental grounds.

The motion, when put to the meeting by the President, was carried with acclamation and briefly acknowledged by Prof. Bone.

The President expressed the thanks of the Society to the Officers and Managers of the Royal Institution for the use of their historic lecture theatre; the occasion was the first ordinary scientific meeting of the Society held at the Royal Institution.

In acknowledgment, Sir Robert Robertson, K.B.E., F.R.S., said that the Managers delighted to lend their theatre for an experimental lecture such as that which they had just heard. He also expressed the hope that membership of the Royal Institution would be brought more widely to the notice of non-members.

CORRESPONDENCE

LEAD-LINED PLANT AND CHEMICAL STONEWARE

SIR,—I am obliged to Mr. G. N. Hodson for his observations on my comments on the Report of the British Chemical Plant Manufacturers' Association, but am afraid he has quite failed to appreciate my purpose. I made no statements which could in any way be construed as an attack on the quality of British-made chemical stoneware. What I did was to point out certain inaccuracies in the Report.

Mr. Hodson appears to think that it is somewhat of an epoch-making event that his firm is able to supply material which will withstand a temperature of 220° C. Far from this being the case, however, it is a fact that stoneware which successfully stood up to this temperature was made and supplied by at least one manufacturer during the war period, and it was even in those days not considered to be an achievement calling for any particular comment.

Nobody who knows anything at all about chemical stoneware would controvert Mr. Hodson's statement that the quality of the body is more important than that of the glaze, and certainly I did not do so.

The definite statement that the glaze on foreign-made stoneware was frequently more porous than the body is not accurate, as I pointed out, and it is difficult to understand how such a statement ever found its way into the Report. It is extremely difficult, as Mr. Hodson points out, to ensure that a glaze shall be absolutely free from imperfections, but this applies to British as well as foreign ware.

If the glaze on stoneware is attacked by the batch undergoing treatment, and this of course can happen, surely a glaze should not be employed in such cases. I would point out that if a glaze is destroyed by any such agency not only would the batch be contaminated with iron but also with other constituents of the glaze which might be even more harmful still.

In my practice I have found it unwise to accept porosity figures issued by interested manufacturers. Porosity determinations are made by different methods, and do not at all agree amongst themselves, and there is a great temptation for makers to select the particular method which gives the lowest figure. I recall one instance where identical samples were sent to a number of testing laboratories with the sole purpose of finding out which returned the lowest figure, and this figure was used for publicity purposes.

I think I can, with justification, claim a much longer and more intimate acquaintance with chemical stoneware than Mr. Hodson, and it is because of this that I very much doubt the possibility of any manufacturer being able, consistently, to supply large units with a maximum of 1% porosity. To do so would mean perfect workmanship, an absolute freedom from lamination, holes, fissures, and the attainment of absolute uniformity in every part of the kiln, and this is not, as yet, a practical proposition.

I am, Sir, etc.,
M. BARRETT

Leeds
Oct. 17, 1933

A WARNING TO CHEMISTS

SIR,—Some time ago you issued a warning regarding one or two seafaring individuals who were going about the country selling Persian rugs. They gain access to laboratories and institutions by saying that they had seen Professor So-and-so who had told them to call on you. They then use your name in the next instance, and so on. They came to me saying that Prof. Slater Price of Edinburgh (who is an old friend of mine) had recommended them to see me when they got to London. Of course he did nothing of the sort.

They have now appeared again. A few weeks ago I was told they called here. I was away and therefore missed the opportunity of dealing with them. But I heard to-day that they are "working" Portsmouth, calling on members of the Institute of Chemistry and using my name to gain admittance.

I don't know whether you would care to repeat the warning issued previously. The use of my name and those of others is entirely unauthorized of course.

They seem to obtain prospectuses of institutions and lists of members somehow, and then boldly call and ask for the chemist by name. The nuisance is rather difficult to deal with legally.

I am, Sir, etc.,
CHARLES DORÉE

London, S.W.
Oct. 23, 1933

RANCIDITY OF OILS AND FATS

SIR,—We have noted with interest the comments of Mr. J. K. Giles on our method of determination of the peroxide value of oils in your issue of October 13, 1933, and the points raised by him are important. We would like however, to take this opportunity of drawing attention to the conditions under which the peroxide value of fats should be determined.

In our original paper (J.S.C.I., **50**, 89 T), we drew attention to the possible existence of two forms of peroxide which may be produced in oils and fats and these two forms were termed by us easily reducible (E.R.) peroxides and peroxides reducible with difficulty (D.R.)

For the purpose of following the oxidative changes in an oil or fat in the early stages during the induction period and for a short time after the rapid rise in oxidation which follows this period, the determination of the peroxide figure is of value, but we re-affirm our opinion that the E.R. value should be determined at temperatures not exceeding 60° C. and certainly not at 100° C. The type of actual oxidation taking place in the early stages is still obscure, and though some form of addition of atomic oxygen is evidently involved, the combination is labile, and inter-molecular movement takes place, a movement evidently accentuated by time and more particularly, by temperature. The rise, slight fall, and renewed rise of the peroxide value in such oils as whale oil at ordinary temperatures is a case in point. It is on account of the possibility of change from the peroxide form to a more stable oxidation form that we insist that the ordinary test should be made at room temperature. The point raised by Mr. Giles regarding the difficulty of solution of a hard fat in acetic acid is perfectly correct but is readily overcome by using a few c.c. of carbon tetrachloride with the acetic acid, a modification used by ourselves and also drawn attention to by Wheeler in America. The possibility of error when working at 100° C. is illustrated by the following figures obtained for a ground nut oil blown with air at 150° C. for four hours:

Peroxide figure, room temperature ...	1·8
,, ,, 100° C.	4·8
Total peroxide figure (20 minutes at 100° C.)	25·0

The determination of the peroxide value and its correlation with keeping quality would appear to be the most helpful line of investigation at the present time, as it is the rate of progress in the initial stages of oxidation that is important rather than in the later stages when scission of the glyceride has taken place and when the effects are readily evident to taste and smell. A complete elucidation of the chemical changes taking place in rancidity is of scientific interest but a clear understanding of the bearing of the initial stages would be of great practical value.

We are, Sir, etc.,
A. TAFFEL and CECIL REVIS

London, S.W.
Oct. 23, 1933

PERSONAL AND OTHER ITEMS

Dr. Frank T. Shutt, the well-known agricultural chemist, Dominion Chemist in Canada and assistant director of the Central Experimental Farm at Ottawa, has retired after more than 45 years' work for agriculture in Canada. Dr. Shutt has been for many years one of the most active and popular members of the Society in Canada. He took a leading part in the establishment of the Ottawa Section, of which he has been chairman on four occasions. His retirement was marked by a reception in his honour at the Central Experimental Farm on October 6 and a presentation by his colleagues at the Farm.

We regret to announce the death on October 13 of Mr. Francis Greville Williams, chairman of Williams (Hounslow), Ltd., the dyestuffs manufacturing concern. Mr. Williams was the son of Greville Williams, a distinguished chemist who was responsible for much of the early work on dyestuffs, and had himself taken a leading part in the industry for many years. An obituary notice will appear in a later issue of the JOURNAL.

Sir William Larke, director of the National Federation of Iron and Steel Manufacturers, has been elected president of the Institute of Fuel in succession to Sir Hugo Hirst.

Prof. T. H. Morgan, of the Institute of Technology in California, has been awarded the Nobel Prize for Medicine for 1933.

Chemical Engineering Group

The next meeting of the Chemical Engineering Group will be a joint one with the Oil and Colour Chemists' Association and will take place at 7.30 p.m. on Thursday, November 9, at 30, Russell Square, London, W.C.1. Dr. Jordan will open a discussion on "The Function of Paint as a Metal Preservative," and a number of other authoritative speakers will follow. Dr. Jordan will deal briefly with the various metals in question, then with the condition and preparation of the surface, and finally with the construction

f the paint coat, including consideration of the functions f priming coats and the finishing coat. All members f the Society are cordially invited to attend.

Chemical Society: Announcements

The following announcements were made at an ordinary scientific meeting held on October 19:

At the ordinary scientific meeting on November 16 Dr. R. Fraser Thomson will open a discussion on "Condensed Aromatic Ring Systems."

Applications for grants from the Research Fund must be received by December 1; applications from Fellows will receive prior consideration. All persons who have received grants and whose accounts have not been declared closed are reminded that reports must be returned by December 1.

The list of Fellows for 1933 can be obtained, price 1s., from the assistant secretary.

The Annual Chemical Dinner will be held at the Wharncliffe Rooms, Hotel Great Central, N.W.1, on Tuesday, November 28, at 7 for 7.30 p.m. Tickets, price 12s. 6d. each, can be obtained from Mr. F. A. Greene, Chemical Club, 2, Whitehall Court, S.W.1.

On Wednesday, November 8, in the meeting room of the Chemical Society, Drs. J. G. King, L. Horton, and F. A. Williams will read a paper before the Institute of Fuel entitled "The Progressive Action of Hydrogen on Coal." A cordial welcome is extended to Fellows of the Chemical Society to attend and take part in the discussion. Advance proofs of the paper can be obtained from the Secretary of the Institute of Fuel, 53, Victoria Street, S.W.1.

Institute of Chemistry—Pass List

The following have passed the examination in General Chemistry for the Associateship of the Institute of Chemistry: Cooper, N. E., Currington, Joan M., Finklestone, E., Garrett, H. E., Heading, W. R., Heron, N., Holt, P. F., Macnair, J. A., Marriott, J. A., McKinlay, R. H., Merry, J. S., Peacop, J. T., Shanks, S., Stevens, S. G. E., Tattersall, J., Waye, B. E., Young, J. H.

The following have passed the examination for the Fellowship: in Branch A (inorganic chemistry, with special reference to metallurgy), Harrison, W. F.; in Branch C (organic chemistry), Cooksey, A.; in Branch D (biochemistry), Loach, J. V.; (biochemistry, with special reference to the chemistry of proteins), Aitken, H. A. A.; in Branch E (the chemistry, including microscopy, of food and drugs, and of water), Johnson, F. R., Parekh, M. M.

Evasion of Dyestuffs Import Duties

Mr. T. Rowe, a chemical manufacturer of Worsley Street Chemical Works, Salford, was recently fined £70 and ordered to pay £40 costs for attempting to evade Customs duties and for making false declarations in respect of dyestuffs imported from France. The summonses related to under-payment of duties stated to total £631.

Post Office Research

Many scientists and engineers attended the opening of the Post Office Research Station at Dollis Hill, London, on October 23. The buildings and workshops cover eight acres and have cost approximately £150,000, and the staff numbers 215, including 95 research engineers.

MARKET REPORT

This Market Report is compiled from special information received from the manufacturers concerned.

Unless otherwise stated, the prices quoted below cover fair quantities net and naked at sellers' works.

The following alterations in prices are reported since the publication of the last Market Report (cf. CHEM. & IND., Oct. 6, 1933, p. 802).

TAR PRODUCTS

Xylol.—2s. 5d.–2s. 6d. per gal. Pure, 2s. 6d.—2s. 7d.

INTERMEDIATES

Items marked thus * d/d buyers' works.

*Nitrobenzene.—Spot, 4¼d. per lb., in 90-gallon drums, drums extra. 1-ton lots.

PATENT LIST

The following is a list of complete specifications of chemical interest which are open for inspection under Section 91 (4) (a) of the Patent Acts. Printed copies are not available, but photographic copies may be obtained at a charge of 8d. per page (minimum 1s.) from the Patent Office, Chancery Lane, W.C.2.

I. 10,091 (1933). I. G. Farbenind. **Apparatus for measuring densities or opacities.**

II. 10,258 and 10,371 (1933). Rouault. **Treatment of bitumen, pitch, and tar.**

10,372–3 (1933). Rouault. **Treatment of natural or artificial bitumen, asphalt, and similar products.**

III. 5469 (1933). Henkel & Co. **Manufacture of high-molecular mercaptans.**

7871–2 (1933). Chem. Fabr. vorm. Sandoz. **Manufacture of aminonaphtholsulphonic acids containing residues of bile acids and the manufacture of dyestuffs therefrom.**

9638 (1933). *Chem. Works, formerly Sandoz. See* VI.

10,122 (1933). Deuts. Hydrierwerke. *See* VI.

10,260–1 (1933). Wülfing and Möller. **Making compounds containing heavy metals and sulphhydryl groups from keratinates.**

IV. 7871–2 (1933). Chem. Fabr. vorm. Sandoz. *See* III.

V. 9746 (1933). Jacobs. **Preparing fibres for spinning.**

10,200 (1933). Liebowitz. **Washable textile fabrics permeable by air and moisture.**

VI. 9638 (1933). Chem. Works, formerly Sandoz. **Wetting, foaming, detergent, emulsifying, and dispersing agents, and process of preparing them.**

10,122 (1933). Deuts. Hydrierwerke. **Manufacture and utilization of substances suitable for use as penetrating, wetting, emulsifying, dispersing, foaming, cleansing, and like agents.**

VII. 9997 (1933). I. G. Farbenind. **Manufacture of potassium dichromate.**

10,217 (1933). I. G. Farbenind. **Production of caustic alkalis in a form suitable for packing and transport.**

X. 16,939 (1932). Gravell. **Metal-cleaning compositions.**

6556 (1933). Krupp A.-G. **Treatment of austenitic chromium–nickel steel alloys.**

10,040 (1933). Junker Ges. *See* XI.

XI. 10,040 (1933). Junker Ges. **Electric furnaces for the heat-treatment of metallic strip.**

XII. 9969 (1933). Standard Oil Co. **Preparing fatty oils.**

XIII. 10,116 (1933). Brit. Celanese, Ltd. **Synthetic resins and their manufacture.**

10,360—1 (1933). Lovinsohn, Schnelling, and Lövinsohn. Light-fast inks for printing with rubber printing surfaces.

10,442 (1933). Du Pont de Nemours & Co. Manufacture of paints, enamels, and lacquers.

10,581 (1933). Du Pont de Nemours & Co. Manufacture of mixed esters of polyhydric alcohols and resins and coating compositions manufactured therefrom.

XIV. 1901 (1933). Goodyear Tire & Rubber Co. Vulcanization of rubber.

9929 (1933). Internat. Latex Processes. Production of rubber bands, thread, strips, etc.

XXI. 10,719 (1933). Telefunken Ges. f. Drahtlose Telegraphie. Luminescent screens and luminophores for use therein.

GENERAL NOTES

Official Trade Intelligence

The Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1, has received the following inquiries for British goods. British firms may obtain further information by applying to the Department and stating the specific number. *Argentina:* Lubricating oils (448). *Australia:* Stainless steel and nickel alloy sheets (422). *Austria:* Soap (430); Paper (431). *British West Indies, Trinidad:* Linseed oil, raw and boiled (423). *Canada:* Oxy-acetylene welding rods (424). *Hungary:* Paint, dyes, and colours (439).

Safeguarding of Key Industries

On November 17 and 18 there will be a hearing of the complaint which the Board of Trade has received under Section 1 (5) of the Safeguarding of Industries Act, 1921, that insulin and its salts have been improperly excluded from List H (iii) of articles chargeable with duty under Part I of that Act, as amended by Section 10 of the Finance Act, 1926. The hearing will commence at 10.30 a.m. in the conference room, No. 47, Board of Trade, Great George Street, London, S.W.1, and the tribunal will consist of: Hon. S. O. Henn Collins, C.B.E., K.C. (the referee), Prof. F. G. Donnan, C.B.E., F.R.S., and Prof. Samuel Smiles, O.B.E., F.R.S.

An additional list of articles chargeable with duty under Part I of the Safeguarding of Industries Act, 1921, has been issued by the Board of Trade, and will take effect as from November 3, 1933. This list refers to articles under the following heading: Synthetic, organic and other fine chemicals. Copies of the list may be obtained from H.M. Stationery Office (1d.).

Nickel in Electric Furnaces

To-day many of the older methods of low-temperature heat treatment, *e.g.*, baths of oil, lead, or salt, are giving place to new types of forced air circulation electric furnaces. An article in *The Nickel Bulletin*, Vol. 6, Nos. 8—9, describes in an interesting way the extent to which the use of nickel enters into the construction of such furnaces. Another short article shows how nickel is being employed in solving problems caused by corrosion in hydraulic engineering. *The Nickel Bulletin* can be obtained from the Mond Nickel Co., Ltd., Thames House, Millbank, London, S.W.1.

PUBLICATIONS RECEIVED

A Study of the Refining of a Burmah Crude Oil with Special Regard to the Colour Reversion Characteristics of the Lubricating Oil Distillates. By A. R. Bowen, M.Sc., Ph.D. Pp. 12. Reprinted from the *Journal of the Institution of Petroleum Technologists*, Vol. 19, No. 115, Pp. 364—375, May, 1933

Prospectus of University Courses in the Municipal College of Technology, Manchester: Session 1933—34. Pp. 382.

Biochemical and Allied Research in India in 1932 Pp. 86. India: Society of Biological Chemists.

Kohlenwasserstofföle und Fette: Sowie die ihnen chemisch und technisch nahestehenden Stoffe Revised and edited by Prof. Dr. D. Holde together with Dr.-Ing. W. Blayberg. 7th revised ed. Pp. xi + 1046. Berlin: J. Springer, 1933. 78 rm.

Report of the Government Chemist upon the Work of the Government Laboratory for the Year ending March 31, 1933. Pp. 46. London: H.M. Stationery Office, 1933. 9d.

Physical Chemistry of Living Tissues and Life Processes. By R. Beutner, M.D., Ph.D. Pp. x + 337 London: Baillière, Tindall & Cox, 1933. 25s.

Liquid Crystals and Anisotropic Melts. A General Discussion held by The Faraday Society, April, 1933. Pp. 881—1085. London: The Faraday Society 1933. 12s. 6d.

Report on the Economic Situation in Norway to the End of June, 1933. Ref. No. C. 4188. Pp. 27 London: Department of Overseas Trade, 1933.

Report of the Forest Products Research Board: With the Report of the Director of Forest Products Research for the Year 1932. Department of Scientific and Industrial Research. Pp. vi + 58 London: H.M. Stationery Office, 1933. 4s.

Kolloidchemie der Eiweisskörper. By Prof. Dr. W Pauli and Dr. E. Valkó. 2nd revised ed. Handbuch der Kolloidwissenschaft in Einzeldarstellungen. Vol. VI. Pp. xiv + 353. Dresden and Leipzig: T. Steinkopff, 1933. Paper, 28 rm.; bound, 30 rm.

Some Physical Properties of the Covalent Link in Chemistry. By N. V. Sidgwick. The George Fisher Baker Non-Resident Lectureship in Chemistry at Cornell University. Pp. 249. New York: Cornell University Press; London: H. Milford, Oxford University Press, 1933. 10s.

Transactions of the Institution of Chemical Engineers. Vol. 10, 1932. Pp. 191. London: Institution of Chemical Engineers. 21s.

Solvents. By T. H. Durrans, D.Sc., F.I.C. Being Vol. 4 of a Series of Monographs on Applied Chemistry. Edited by E. H. Tripp, Ph.D. 3rd and revised ed. Pp. xvii + 205. London: Chapman & Hall, 1933. 10s. 6d.

Mass-Spectra and Isotopes. By F. W. Aston, Sc.D., F.I.C., F.R.S. Pp. xii + 248. London: E. Arnold & Co., 1933. 15s.

Allen's Commercial Organic Analysis. Edited by C. Ainsworth Mitchell, M.A., D.Sc., and several contributors. Vol. X, 5th ed., revised and partly rewritten. Proteins of Blood etc., Vitamins, Hormones, Woods and Charcoals, Pectic Substances. General Index. Pp. xi + 817. London: J. & A. Churchill, 1933. 32s.